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WHY PROHIBITION ?

A Manual for Temperance, Social Service
and Congress Workers

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DEDICATED

TO

The Memory of

THE FATHER OF OUR NATION

AND

The Stoutest Champion of Prohibition

WHO BEING DEAD, YET LIVETH

In the Hearts of All True Indians

PREFACE

IT was my good fortune to spend nearly a week at Ahmedabad, Gujarat, in the company of the late Shree Mahadev Desai in September, 1941. While there, I addressd public meetings every afternoon on topics of national interest. At his special request, I spoke through an interpreter to a large audience of industrial workers and students about the injury suffered by manual workers and intellectuals through drinking.

At the end of the meeting, Shree Mahadev was kind enough to congratulate me on the way in which the material I had used had been marshalled and suggested that I should throw it into the form of a couple of short articles for the *Harijan*.

After further conversation, I came to realise that Shree Mahadev, like myself, knew that drinking had grown into such a menace in western countries that individuals as well as learned societies there had felt compelled to undertake researches in regard to different aspects of the alcohol problem and that these

had placed at the disposal of temperance and social service workers much valuable material which can be utilised in dealing with the drink problem in our motherland.

Those who have worked in this particular field are aware that, whatever the reasons, we in India have practically no work of the type already done in the West. And it was therefore that when Shree Mahadev came to know more about the great interest I took in the matter and the literature on it I had already studied, he advised me to use such material as I had already collected for a book on prohibition. This explains why I have been compelled to depend on the findings of western scholars in support of such views as have been advanced by me.

When in the course of our conversation, I said that I was quite confident that when the Congress came into power, it would, if faithful to the programme it had sponsored all along, introduce prohibition all over India and therefore there was not much need for such a book, Shree Mahadev drew my attention to the indispensability of educating the public in regard to the injurious effects of drinking thus keeping up the anti-drink feeling on the widest possible scale. He contended that this is necessary so that

when this great social experiment was given a trial, our leaders might have the backing of all the people excepting the drinkers, those interested directly or indirectly in the liquor trade and others who view with feelings of dismay any prospect of being compelled to pay additional taxes inevitable if prohibition is implemented.

Shree Mahadev's idea was that the book should be of a factual and authoritative character and should supply the kind of information required by the general reader aswell as by the temperance, social service and Congress worker. This advice of my late and valued friend I have always tried to keep before my mind but with what success is for the reader to judge.

I shall feel amply rewarded if those for whom the book has been written find in the pages which follow some information they can use to impress on people with whom they come in contact, the serious damage suffered by individuals as such through indulgence in alcoholic beverages.

Constitution House.
NEW DELHI.
20th August, 1948.

H. C. Mookerjee

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CHAPTER I

MODERN ALCOHOLIC BEVERAGES

The exact time when alcoholic beverages were discovered and used is not known. But the very earliest Egyptian, Chinese, Hebrew and Indian writings give accounts of drunkenness and the steps taken to reduce it.

There are Egyptian frescoes not less than 5,000 years old showing men making wine from grapes and beer from barley and the inebriety caused by them. A very ancient Egyptian tomb carries the inscription, "this young man's days were cut short because he drank wine." Egyptian writing tablets contain warnings and exhortations against drunkenness.

The Chinese found out how to make wine from grape juice about the same time as the Egyptians. Archdeacon Farrar relates that, according to a Chinese tradition, an emperor of China prohibited the consumption of intoxicating liquors about 4,000 years ago. The manufacture of liquor from rice was invented by a clever agriculturist named I-tye. This happened in 2,207 B. C., and Ta-Yu, the then emperor, expressly forbade the manufacture or use of it under the severest penalties. Inspite of this restriction, drunkenness through the consumption of wine became so extensive that one of his successors round about

1,100 B. C., not only repeated warnings against liquor but ordered the destruction of the grape vine since which time it has not been re-introduced in China.

The Bible makes repeated references to the drinking of liquor made probably from the juice of the grape. The earliest of these is the account of the drunkenness of Noah who is supposed to have built the ark about 4,000 years ago.

Condemnation of drinking is found in the Rig Veda the earliest of the four vedas, in the Smritis and Srutis, as also in Manu, and in Kautilya. The severity of the penalties imposed suggests that excessive drinking had become so common as to call for deterrent punishment.

From Mesopotamia, the grape and the olive went first to Greece and thence to Rome. Both the Greeks and the Romans had various kinds of wines the excessive consumption of which was condemned by Homer on the one hand and Pliny on the other.

The process of distillation is said to have been discovered in the twelfth century for we find the surgeon Albucassis of Zahana, called Abul Cassis by his contemporaries, who died in 1,120, A. D., giving a detailed description of a distilling apparatus made of glass and burnt clay. It should, however, be added that this knowledge was used for the manufacture of liquors like whisky, brandy, rum and gin from about the middle of the fifteenth century.

Present Day Alcoholic Beverages

Alcoholic drinks in popular use today fall under three groups—fermented liquors like beer, toddy and pachai, wines including home-made wines such as currant, raspberry, elderberry and rhubarb wines and spirits or distilled liquors including country spirit, generally known as arrack.

The quantity of alcohol contained in some of the more popular alcoholic beverages is as follows :—beer, ale, porter and stout contain from 4 to 7 per cent though some of the stronger varieties of the first, according to evidence placed before the Departmental Committee on Beer Materials, 1899, contain as much as 10 per cent. Pachai, almost exclusively used by our aborigines, is said to contain 5 to 7 per cent and toddy 8 to 12 per cent.

The alcohol content of port wine, sherry, claret and champagne varies from 10 to 20 per cent, marsala containing nearly 25 per cent being the strongest in this class.

Home-made wines mentioned above do not generally contain more than 10 per cent alcohol. These are made by the fermentation of the juices of different berries, fruits, etc. They can cause intoxication as much as any other variety of alcoholic beverage.

Distilled spirits such as brandy, whisky, rum, gin, etc., contain not less than 40 to 55 per cent alcohol while arrack contains from 35 to 40 per cent.

It has been repeatedly urged that the drinking of toddy in India, like the drinking of beer in England, is harmless or nearly so by reason of its low alcohol content.

The utter futility of this argument becomes clear when we remember that all the beverages mentioned above as well as others to which no reference has been made, owe their potency to their alcohol content, the amount being only a matter of proportion. The injurious results of beer or toddy drinking are no less serious than those from the use of stronger liquors such as whisky. This may be easily realised when we remember that the smallest amount consumed viz., a pint, contains as much alcohol as a glass of strong whisky and water. There is, however, a difference which is that as the alcohol in the beer is in a more diluted form than that in the glass of whisky and water, the former is somewhat less irritating to the mucous membrane of the stomach. This, however, makes no difference so far as damage to the other parts of the system is concerned.

Fermentation

Naturally enough, alcoholic beverages are not made from one and the same raw material but however different these liquors may be from one another in looks, in taste, or in their powers of intoxication, the alcohol contained in all of them and which only makes these welcome to the drinker, is the result of a chemical process known as fermentation.

An air-borne micro-organism called the yeast plant is responsible for the fermentation by which alcohol is produced. The yeast plant develops a ferment which acts on some varieties of sugar splitting them up into alcohol and carbonic acid gas. These sugars are found in many substances such as apples, grapes and similar fruits and berries and also in barley and other grains under certain circumstances.

When yeast is put into any warm mash, mixture or solution containing sugar in any form, the plant thrives vigorously, bubbles of carbonic acid gas rise to the surface and alcohol is produced. After sometime, there is less activity and finally, when the alcohol present in the solution reaches about 14 per cent, the fermenting agent ceases to function ; in other words, it dies being poisoned by its own excretion. It therefore follows that by fermentation only, it is not possible to get any liquor containing more than 14 per cent alcohol,

Fermented Liquors

A grain of barley contains a large amount of insoluble starch lying in contact with the small embryo plant. The starch is changed into a soluble form of sugar as soon as the grain becomes moist, warm and ready to germinate. Normally, the germinating plant feeds on this sugar until it is ready to send out rootlets into the soil thus becoming an independent plant.

The first operation of the beer manufacturer is to

start the process of germination by moistening the grain and keeping it warm until part of the starch has been converted to diastase that is the special variety of sugar which ferments most readily. It is then heated to check the process of growth of the embryo plant which would otherwise use it up. The next process consists in crushing and grinding the sprouting grains so that all the rest of the starch may be acted on by the diastase. The whole thing is next placed in a tub at a warm temperature and allowed to ferment with yeast when the soluble sugar is rapidly converted into alcohol, carbonic acid gas and water. It is then transferred to other vessels to clear. Hops are added to give the beer its bitter taste and impart to it its stupefying effect. Ale, porter and stout are the same as beer but the flavouring and the alcohol content are different.

The above description, on very general lines, of the manufacture of fermented liquors in the west is true only where the raw materials mentioned are used. As the result of investigations carried on by the Inland Revenue Department of the United Kingdom, it was found some years ago that the profit motive had induced many breweries to use "malt substitutes, hop substitutes and various chemicals for preserving the beer."

According to page 381 of the Minutes of Evidence presented to the Departmental Committee on Beer Materials as quoted by Sir Victor Horsley in his *Alcohol and the Human Body*, these included the coal

tar product saccharin, vitriol, bisulphite of calcium, salicylic acid, magnesia, tannin, sulphuric acid, chalk, grains of paradise, guinea pepper, coccus indicus, and even salts of arsenic and copper.

The injurious effects of beer even when made out of barley and hops only are bad enough and these are greatly increased when they are fortified by the addition of some or other of the adulterants just mentioned. The following extract from page 29 of the above mentioned book shows how efforts made to stop the adulteration of beer failed.

"The incessantly repeated efforts of some members of Parliament to obtain legislative power to stop this method of brewing from refuse and other substances have all failed in view of the influence of the drink traders."

Toddy is prepared from the juice obtained from the cocoanut, palmyra or date palm. The so-called "sweet" toddy, known in some parts of India as nira, is the unfermented juice, universally admitted as a useful non-alcoholic drink. It is understood that the fermentation of the fresh juice is assisted by the addition of certain substances to it, the nature of which varies from area to area and that very often the seeds of datura are finely powdered and added to the toddy to increase its intoxicating effects.

Pachai or rice beer is an alcoholic beverage made from cooked rice which is broken up and then allowed to ferment in a large quantity of water to which substances are added to hasten the process. It contains about the same amount of alcohol as the weaker

varieties of beer and is said to possess some nutritive value as, owing to the primitive methods of its manufacture, part of the starch contained in the rice is not changed to sugar which only undergoes fermentation.

Wines, Natural, Artificial and Medicated

The air-borne micro-organisms producing the kind of ferment which converts grape sugar into alcohol, collect on the outside of ripe grapes but they cannot attack the juice which contains the sugar so long as the skin is unbroken. But as soon as the grapes are crushed and their flesh squeezed into a pulp, they begin to increase very rapidly at the same time producing their ferment which converts the sugar contained in the grape juice into alcohol and carbonic acid, bubbles of which escape freely from the fermenting mass. Occasionally, sugar is added to the juice to increase the amount of alcohol in the wine.

For many centuries, grapes constituted the only source of wine. Later on, other sweet fruit juices such as the juice of ripe apples, figs, etc., were used for the manufacture of liquor but these are not called wines.

"White" wines are made from white grapes, "dry" wines are those that have a minimum of both sweetness and acidity. Champagne or other "sparkling" or effervescent wines, like aerated waters, contain carbonic acid gas while those that do not effervesce are called "still" wines.

There are many kinds of wines nearly all of which are produced in France, Spain, Germany and Italy. The names of the various wines are usually derived from the place of manufacture. For instance, madeira comes from the Madeira Islands, port from Portugal, malaga and sherry from Spain, champagne, burgundy and bordeaux from those parts of France where they are produced, etc. The alcohol content of some wines is frequently increased by fortifying that is by the addition of brandy, etc., to them.

It is not generally known that Europe does not produce sufficient grapes to supply the quantity of wine drunk throughout the world. Other means to meet the demand have been contrived and the chemist has shown the manufacturer how to combine plain alcohol with various coloured liquids (turmeric, logwood and other dyes being used) and suitable flavouring and to label and sell the resulting decoctions as one kind of wine or other.

The manufacture of imitation wines has assumed such proportions that Dr. Lethaby said in his article on this subject in the *Encyclopaedia Britannica* that

"A great part of the wine of France and Germany has ceased to be the juice of the grape at all. It is hardly possible to obtain a sample of genuine wine, even at first hand."

The special drawback of these artificial wines is that some of them are more intoxicating than natural wines made from grape juice and are preferred not only on account of their comparative cheapness but

also because of their greater potency due to their containing a somewhat larger percentage of alcohol.

Some wines to which other substances are added are sold as medicated wines and the makers claim that they are useful as medicine. Some of these are said to contain extract of meat and, as such, to have the effect of serving both as concentrated food as well as tonics.

A Commission appointed by the British Government in 1912, however, held that the amount of meat extract contained in most of them is so small as not to have any nutritive value. It was also stated that all medicated wines contain a large or fairly large percentage of alcohol so that people who consume them for any considerable length of time gradually develop into habitual drinkers and when this happens, most of them are insensibly drawn into the ranks of those who consume one or other of the more common varieties of alcoholic beverages. The Commission therefore felt compelled to state that

"There can be no doubt that many persons acquire the 'drink habit' by taking these wines and preparations, either knowing that they are alcoholic, since they can be purchased and consumed without giving rise to the charge of 'drinking', or in ignorance that they are highly intoxicating liquors."

It concluded by saying that "grave injury is done to the public by the existing large sale of medicated wines."

Distilled Liquors

So far we have dealt with the manufacture of alcoholic beverages from liquids containing sugar and have found that when the alcohol produced in them reaches 14 per cent or so, the process of fermentation stops and the yeast cells can produce no further alcohol. It thus follows that we must adopt some other process if we desire to produce liquors containing alcohol in higher proportions. What has to be done is to separate the alcohol from the water with which it is mixed. As alcohol boils at 170 degrees and water at 212 degrees Fahrenheit, all that is necessary is to heat the fermented liquor so that the alcohol may be driven off in the form of vapour and most of the water left behind. The alcohol vapour passes from the still when the fermented liquor is heated through a long tube which is kept cool. This condenses the vapour which falls into the receiver in the form of a liquid.

The principal distilled liquors, generally called spirits, popular in western countries are brandy, whisky, rum, and gin. The first is obtained by distilling wine produced from the fermentation of grapes. From what has appeared previously, it is clear that though this might have been the case in the past, today the brandy placed on the market is only an imitation of the pure product.

The term whisky is derived from a Gaelic word meaning water of life. Its manufacture in Scotland

and Ireland goes back to the Dark Ages. It is understood that the smoky taste peculiar to Scotch and Irish whisky and which makes for its popularity among certain sections of users of liquors, is due to the burning of peat-moss under the drying ovens while preparing the malt.

Almost any cereal can be used as raw material for the manufacture of whisky though in the best variety only barley is used. This is reduced to a coarse flour and then scalded to break down the starch cells when it is called mash. The addition of yeast to malted grain causes the mash to ferment, the malt diastase converting the grain starch into sugar, which, in turn, is converted into alcohol. The fermented mash is next distilled over a slow fire to obtain this variety of alcoholic beverage. It is matured in oak barrels usually charred inside. It is said that it is this charring which imparts its peculiar colour to whisky. Newly distilled whisky is colourless and has its own taste which is modified during the years when it is maturing.

Almost all distilled spirits and specially whisky contain small amounts of what are known as fusel oils which were formerly regarded as injurious to health. It was also believed that "ageing" purifies the whisky by destroying the fusel oil contained in it. It is held now that, mainly because of the progressive loss of water and alcohol through evaporation, there is a slight increase in the quantity of fusel oil. The absence of the unpleasant flavour due to it does not

result from its disappearance but from the gradual development of chemical substances the pleasant odours of which disguise that of fusel oil. It was to get rid of this uninviting taste that the ageing process came into use. This alters the taste but imparts no physiological benefit to distilled spirits.

It is understood that the most highly prized Scotch whisky is the variety known as malt whisky prepared from malt and yeast in the manner just described. Of the American whiskies, bourbon named after the county in Kentucky where it originated, is made from a mash containing 51 per cent or more of maize. Rye whisky is made from rye with admixture of other grains.

How the profit motive has operated in replacing the more expensive malt by cheaper substitutes which yield an inferior quality of this liquor was pointed out in the issue of the *Journal of British Medical Association* dated the 26th December. 1903, as quoted on page 50 of *Alcohol and the Human Body*.

"Originally whisky (or at any rate Scotch whisky) was manufactured solely from barley malt, and this is still the case with some of the whisky distilled in the Highlands in pot-stills. At a moderate computation, roughly two-thirds of the spirit vended nowadays as 'whisky' is derived from other materials, chiefly maize (Indian corn) and refuse molasses. The spirit obtained is (or should be) called 'grain' or 'patent' spirit, the word 'grain' referring to the materials, and the qualification 'patent' to the type of apparatus in which this variety of alcohol is distilled. This spirit, made from different materials by a different process, has 'by-products' that, as might have been anticipated, are different.....

Nevertheless this new spirit is sold as whisky both at home and in the Colonies, and is used for blending with malt whisky, the blend being in some instances so labelled as to give the purchaser the impression that it is malt whisky.... It is known in the trade that much of the so-called whisky most carelessly made from the cheapest materials is exported to West Africa and other tropical colonies, where it is sold under Government sanction to native races."

It further appears that, not content with substituting maize and even refuse molasses for the more expensive barley in the manufacture of whisky, in certain cases sawdust was used as the raw material. It was first converted into a fermentable sugar with the help of acids and then fermented. Inspite of laws enforcing purity of food and drink, there are on the market some varieties of cheap artificial spirits made from alcohol obtained from inferior material so carelessly purified as to contain many harmful substances.

Rum was at one time one of the most popular distilled spirits and was traditionally the favourite drink of sailors. The name is derived from "rumbullion", provincial English for "a great tumult". It was formerly distilled from fermented sugarcane juice and molasses being manufactured extensively in the West Indies, particularly in Jamaica which gave its name to a variety of this liquor. Demerara rum is the rum manufactured in British Guiana. Nowadays, it is made from a mixture containing molasses which is fermented and then distilled.

The name gin or geneva is derived from geneivve,

the French word for juniper. It is made in practically the same manner as whisky, any cereal such as maize, wheat, oats, barley or rye being used as the raw material but the distilled liquor is, in addition, re-distilled with juniper berries, coriander seed, turpentine or some other flavouring material such as orange and lemon peel. In Holland gin, the juniper berries are added to the fermented mash before distillation. Other varieties of this liquor are made by percolating the flavouring materials with the alcohol and then distilling.

In India, the only indigenous variety of spirit we have is arrack distilled from fermented solutions of sugarcane or palmyra jaggery or from mahua flower. It is crude and potent and causes great injury to those addicted to it.

In subsequent pages, we shall use the word alcohol instead of the names of the different varieties of liquor the potency of which depends on their alcohol content because we are primarily interested in the effects of alcohol regardless of the form in which it is consumed.

CHAPTER II

ALCOHOL, FOOD, MEDICINE OR POISON ?

Anti-prohibitionists have sought to defend the use of alcohol on two principal grounds. These are first that the raw materials from which alcoholic beverages are manufactured such as grains, fruits and, in the case of toddy, the sap of the palm tree, are all foods and that therefore the liquors derived from them are also foods. It is also held that as they are oxidised in the body thus supplying heat and energy, they should be regarded as food. The second ground is that alcohol is a useful medicine especially as a stimulant and a tonic.

It is proposed to prove the erroneousness of these beliefs as also to show that not only are alcoholic beverages useless as food and medicine but that, as fundamentally a poisonous substance, alcohol is positively injurious to the human organism.

Alcohol versus Food

Food may be described as "a substance which when taken into the body can be digested and will yield heat and energy, or building material, or both, and will not do any harm to the body when taken in normal amounts." If alcohol, like sugar and starch, yields heat and energy expressed as movement by the

use of our muscles, breathing and the beating of the heart, it must, at least technically, be regarded as a food. It must not, however, be forgotten that unless the substance partaken of serves all or some of these purposes, can be stored in the body and, at the same time, does not damage the body itself, it cannot be considered a food in the real sense of the word.

It is quite true that, approximately, about 20 per cent of our need for energy and heat can be supplied by the oxidation of alcohol in the body. Its drawback as a fuel lies in the fact that this process starts as soon as alcohol reaches the blood and continues at the rate of about 10 per cent per hour, quite regardless of the body's need for heat or energy at the time. This persists till all the alcohol is used up from which it follows that it does not serve any very practical purpose even as a fuel food. Unlike true foods, alcohol cannot be stored in the body tissues to be utilised when required for repair, heat or energy. Even more important than these serious drawbacks as a food, alcohol always exercises a toxic or poisoning effect upon the body to some extent, and especially, on the brain, until the whole of it is either eliminated from or oxidised in the body.

In addition, there are at least five important considerations which put alcohol outside the food class. These have been catalogued by Dr. F. M. Gregg as follows :—

- (1) Unlike true foods the various constituents of which are assimilated by different parts of the diges-

tive system, alcohol is absorbed at practically every point of its journey through the alimentary canal.

(2) Unlike true foods, alcohol undergoes no digestion or change to prepare it for assimilation by the body at any point during its journey through the food canal.

(3) While normally, the indigestible parts of true foods are eliminated in the form of body wastes only after assimilation of what is required by the system, the organs try to get rid of alcohol as quickly as possible especially through the kidneys and lungs.

(4) There is absolutely no proof that alcohol has anywhere or at any time constituted part of the food of the human race in the course of human development.

(5) It seems more than probable that Nature's purpose in oxidising alcohol in the system is to expel it as early as possible rather than to utilise it as a fuel food. This view was put forward by that eminent scientist, Sir Frederick Gowland Hopkins who, speaking at a meeting at the University of London, observed that

"The oxidation of alcohol is the result of the body's attempt to get rid of a poison."

From what has been said above, it follows that instead of similarity, there is a sharp contrast between true foods and alcohol, sufficient proof that it cannot be classified among foods properly so-called. In fact, it is so very unsatisfactory, or rather objectionable, as a food, that Dr. Frederick Peterson, M.D., Professor

of Psychiatry, Medical School, Columbia University, New York City, permitted himself to say that

"It is claimed by some that alcohol is a food. If so, it is a poisoned food."

Alcohol as Medicine

Alcohol masqueraded long as a stimulant, a tonic, a preventive of many diseases and as a helpful agent in the treatment of others and this is relied on as an argument for its use. Omitting all reference to the pioneers who held and expressed contrary views which exposed them sometimes to ridicule and uncharitable criticism and, at other times, to downright persecution, we find that, by the beginning of the present century, there had appeared such a change in the views of the medical profession that it brought forth the following comment from the *London Times* :—

"According to recent developments of scientific opinion, it is not impossible that a belief in the supporting qualities of alcohol will eventually become as obsolete as a belief in witchcraft."

Medical men continued to prescribe alcohol for their patients, attributable partly to mistaken notions as regards its pharmacology and partly to a disinclination among a certain section of the average practitioners of medicine to depart from old and well-beaten lines. It was mainly used by such people in tuberculosis, pneumonia, heart weakness and, to a lesser extent, in scarlet fever. But many a protest coming from progressive physicians was raised against this practice.

So far as the use of alcohol for tuberculosis is concerned, the International Congress on Tuberculosis, held in Paris, in October, 1905, led the way by adopting the following resolution :—

"In view of the close connection between alcoholism and tuberculosis, this Congress strongly emphasises the importance of combining the fight against tuberculosis with the struggle against alcoholism."

Dr. D. A. Knopf, M.D., Vice-President of the British Congress on Tuberculosis, observed,

"Alcohol has never cured and never will cure tuberculosis. It will either prevent or retard recovery. It is like a two-edged weapon, on one side it poisons the system, and on the other it ruins the stomach and thus prevents this organ from properly digesting the necessary food"

As drinking was gradually recognised as one of the predisposing causes of tuberculosis, larger numbers of physicians particularly those who specialised in the treatment of this disease uttered more and more emphatic warnings against the use of liquor in any form. Thus, the Medical Director of a T. B. sanitarium located in Colorado Springs, Colorado, U.S.A., famous for its dry climate, told his patients,

"Trying to cure consumption with whisky is like trying to put out a fire with kerosene."

As regards the use of alcohol in the treatment of pneumonia, Dr. Max Kassowitz, M.D., Professor in the University of Vienna, Austria, said,

"Pneumonia, especially, subsides without alcohol to perfect satisfaction, and I rejoice to agree in this respect with Aufrecht, one of the best authorities on this disease, who in his monograph

in Nothnagle's manual, acknowledges himself hostile to the use of alcohol in the treatment of pneumonia, and hopes that its use may be speedily abolished."

So far as supporting a weak or failing heart through the administration of alcohol is concerned, we find Dr. John Hay, Professor of Medicine, Liverpool University, saying,

"Alcohol is not only futile, but detrimental, when administered in repeated doses to help a failing heart."

Another equally eminent medical man, Dr. Richard C. Cabot, M.D., said,

"In view of this well proved fact (that alcohol does not stimulate the heart under any condition), it follows as a corollary that all recommendations of alcohol as a means to support the hearts of elderly people are the merest rubbish. Alcohol never supported any heart, elderly or young, and never will."

Dr. C. K. Bond, M.D., writing in the *Medical Times*, had the following thing to say in regard to the inutility of alcohol in scarlet fever :—

"Of scarlet fever I have treated some 2,000 cases. I have never seen a case in which, in my opinion, alcohol was necessary ; no case in which its administration was beneficial ; but I have seen more than one case in which its action was directly injurious."

It seems necessary to make a passing reference here to the employment of alcohol in cases of surgical operation in which connection, the views of Dr J. W. Brickley, M.D., as expressed in his contribution to the well-known *Boston Medical and Surgical Journal*, are worth quoting. He said,

"Alcoholics do not bear surgical shock well. Alcohol increases

the chance of infection from a slight wound. Alcohol retards the process of repair."

This is why today alcohol is not administered to surgical patients under the mistaken idea that it hastens recovery and why those among them who are habituated to its use are advised to abstain from it before operation.

The gradual change in the attitude of the medical profession due to the lead given in this direction by most of the eminent physicians and surgeons found expression in 1917, when the House of Delegates of the American Medical Association adopted the following resolution :—

"Alcohol in medicine as a tonic, a stimulant, or as food, has no scientific value and should be discouraged."

While the above crystallised the views of qualified American medical men through their most influential organisation, one of the most eminent among them, Dr. Charles Mayo of the world-famous Mayo Clinic, said,

"Medicine has reached a place where alcohol is rarely employed as a drug being replaced by better medicines."

Alcohol in Hospitals

By 1934, alcohol was described as "a narcotic drug" in the official British publication *Alcohol : Its Action on the Human Organism* while the *Epitome of the Pharmacopeia of the United States and the National Formulary* published in 1934, stated,

"Internally it (alcohol) is a narcotic widely used as a stimulant but may do more harm than good."

The change in the outlook is reflected in the gradual reduction in the quantity of alcohol prescribed for patients in hospitals. Information about this matter so far as hospitals in Great Britain are concerned, was collected by Dr. Courtenay C. Weeks, author of *Alcohol and Human Life*, according to whom the average per capita amount of alcohol used in them in 1900, was 6·08 ounces. In 1932, it had come down to 1·34 ounces and in 1934, to ·69 ounce. In 1936, there was further reduction, the average per capita quantity being less than ·50 ounce. In other words, the quantity of alcohol annually used per patient in British hospitals in 1936, was less than one-twelfth of that used in 1900.

While definite figures for later years are not available, it is agreed on all sides that the decrease continues. Nor has any suggestion to the effect that, as the result of the restricted use of alcohol, patients take longer time to recover from their complaints or that there are more deaths than in the past, been made by any one. There cannot be the slightest doubt that anti-prohibitionists would have immediately made capital if such a contingency had arisen. Their silence is clear proof of the inutility of alcohol as a medicine.

It can now be stated without any fear of contradiction that the regular use of alcohol as a food or as medicine has been given up in British hospitals as

also that patients undergoing treatment in them recover from their ailments more quickly than they did forty years ago when liquor was more extensively used. While it is not suggested that the whole of this improvement is due to the practical abandonment of alcohol in the treatment of diseases, there can be little doubt that the figures given above conclusively prove that alcohol is not at all necessary for the cure of disease.

That eminent American medical man, Dr. D. G. Wilcox, summarised the reasons for the discontinuance of alcohol in the treatment of diseases in the following terms :—

"Alcohol is not a medicine, it aggravates diseases and hastens death, it is productive of physical and mental degeneracy.... It is the best possible persuader of diseases, and damaging even in small quantities "

Verdict of Science on Alcohol

In the pharmacological classification of poisons, alcohol has always been placed side by side with chloroform and ether. And it is therefore scientifically correct to regard it as a poison. The following observation made by the eminent physiologist, Professor Fick, quoted in *Alcohol and the Human Body*, shows that this is how the matter is viewed by competent medical authorities.

"It is a daily occurrence to find persons unaccustomed to the use of alcoholic liquors after drinking a small glass of wine (3 oz.) complain of dizziness, etc., indicating a circulatory disturbance,

During these few moments, it is hardly possible that more than one-third of the teaspoonful and a half of alcohol contained in the three ounces of wine could be absorbed and find its way into the blood. The amount of alcohol in the blood is thus less than one-half volume in a thousand, as the total amount of blood in the body is equal to about five quarts: and yet this almost inappreciable amount of alcohol in the blood causes a very decided disturbance in the action of the nervous system. Hence, there is no reason for being in doubt as to the justice of calling this substance a poison."

That the true nature of alcohol was realised by the layman long before science had pronounced its final judgment, is evident from the use of the word "intoxicating" in describing alcoholic beverages. This is derived from the Greek word "toxicon," the name of the poison into which Greek hunters and soldiers dipped the points of their arrows to increase their deadliness. It therefore follows that when we describe beer, toddy, pachai, brandy, whisky and country spirit as intoxicating drinks, what we really imply is that they are poisonous drinks because each and every one of them contains alcohol in varying proportions. This, however, makes little difference so far as their poisonous effects are concerned which are conditioned by the small or large amount of alcohol taken into the system.

Investigations of Dr. Ridge

The view that alcohol is a poison is based on the results of a series of experiments carried out by trained and highly qualified observers, reference to only a

few among which is made below. Starting from the very basis of life, *viz.*, protoplasm, it was found that alcohol is a poison to cells which consist of little beyond it and water—a matter dealt with in some detail elsewhere. Passing up the scale of life, we find that the germination of seeds is, in many cases, stopped and, in others, retarded, if they are watered with water to which only a trace and nothing more of alcohol is added.

In this connection, reference may be made to the investigations of Dr. J. J. Ridge who placed cress seeds in five closed glass tubes containing identical amounts of earth, water and air, exposing all of them to the same conditions of light and heat to encourage germination. The first contained water ; the second, water containing $1/5,000$ th part of alcohol ; the third, water containing $1/1,000$ th part of alcohol ; the fourth, water containing $1/200$ th part of alcohol and the fifth, water containing $1/100$ th part of alcohol.

It was found that all the seeds in the fifth tube were killed and that the germination of seeds in the fourth tube was less satisfactory than in the third, the germination of seeds in the second better than in the third and that it was at its best in the first tube which contained nothing but water.

Investigations of Dr. Richardson

The equally interesting investigations of Dr. Sir B. W. Richardson, M.D., F.R.S., etc., on the effects of small doses of alcohol on lower forms of animal

life led to similar conclusions. These were conducted on the very small fresh-water jelly fish generally found in ponds. He placed one of these in a tube containing tank water and another in a second tube containing the same water to which alcohol had been added in the proportion of one part in 1,000. Within two minutes, the movements of the jelly fish in the second tube which, prior to its immersion in it, had been seventy-four per minute, were entirely stopped and it began to sink to the bottom. At the end of five minutes, it lay at the bottom of the tube. It was removed and put into plain tank water of the same temperature and left there for two hours but it showed no signs of life. The jelly fish in the first tube containing nothing but tank water moved about unaffected.

A jelly fish was put into a third tube containing tank water in which alcohol had been added in the proportion of one part in 2,000. It remained as though little affected for about four minutes but, at the end of the fifth minute, sank to the bottom motionless. It was then removed and placed in tank water but did not recover. The same thing also happened when a jelly fish was placed in a liquid made up of one part of alcohol in 4,000 parts water.

Other investigators carried out experiments on gold fish, frogs, rabbits and dogs to ascertain whether they developed symptoms of poisoning when alcohol was administered to them. While no reference can

be made to them here, the results arrived at were that damage immediately followed the taking of alcohol and that, in every case, its nature and amount was conditioned by the quantity administered.

All these experiments prove that the poisonous action of alcohol is not in any way changed by its dilution in the vehicle through which it enters the system. The only difference is one of degree from which it is inferable that, whatever might be said to the contrary, moderate drinking always carries along with it the risk of alcoholic poisoning.

Alcohol, a Poison

There is the wrong impression that the word "poison" is applicable only to substances like strychnine or prussic acid which cause immediate death. These are what we are entitled to call quick poisons. But there are also slow poisons such as opium, morphine, heroin, cocaine, etc., which gradually and insidiously undermine the health of the body and, by reducing its powers of resistance, make it liable to many kinds of disease.

When a person who has taken a slow poison like the above succumbs to the attack of any disease, it is rarely that the death certificate gives the real cause. In practically every case, it is attributed to the disease which has ended fatally and which would most probably have never attacked the man if his system had not been previously impaired by the use of the slow-acting poison. At the worst, he would most

probably have made a recovery if he had not damaged his system irreparably through his own folly.

It is therefore that a poison has to be defined in such a manner as to include its two varieties. We may therefore describe it as any substance which, when used, interferes with the normal operation of any of the organs of the body leading directly or indirectly to death which otherwise would not have come at the time that it actually did.

Applying what has been said above to the case of alcohol, we find that it is as much a poison as for instance strychnine for, in sufficiently large doses, it can cause death. Experience has shown again and again that one and one-half pints of whisky taken at one time can kill an average man. Again, two-tablespoonfuls of brandy have caused death to infants.

While it is true that people very rarely drink liquor in quantities large enough to cause immediate death, there is nothing to show that even so-called moderate drinking is not silently modifying the constitution in such a manner as to pave the way for a physical downfall. In such cases, alcohol acts in very much the same way as the white ants described by Henry Drummond in his *Tropical Africa*. Referring to their enormous destructive powers and the insidiousness with which they operate, he describes how

"a settler may be sitting in his hut thinking it as strong as on the day he built it, when suddenly he may awaken to discover that there is nothing around him but a shell. Silently the white ants have been at work eating out the heart of every beam. No-

one has seen them, no one has heard them, no one has noticed them, and then in a moment comes the revelation, when the very pillars of the house do tremble and the revelation is but secret ravage."

The correctness of the above view from the angle of longevity is proved by what was said by Dr. B. E. Grant, M.D., Superintendent, Glendale Hospital, Glendale, California, U.S.A.

"Alcoholism and its chronic poisoning result from the habitual use of alcohol even when this is not taken in amounts sufficient to produce drunkenness. Statistical laboratory evidence shows clearly to the unprejudiced mind that even the moderate use of alcohol by any large group of people will increase the death rate of the group as compared to a similarly constituted group using no alcohol."

The views of this American medical man were underlined by that eminent British physician, Sir Andrew Clark, M.D., etc., who said,

"Alcohol is a poison, so is strychnine, so is arsenic, so is opium. It ranks with these agents. Health is always in some way or other injured by it."

We might conclude by recalling what Forel had to say on this matter.

"The statement that a poison (referring to alcohol) can be at the same time a food is a play on words."

CHAPTER III

ALCOHOL AND THE VITAL ORGANS (I)

Investigations have been conducted by competent medical men throughout Europe and America to ascertain the effects of alcohol on the human organism as the result of which people have been and are being cautioned repeatedly against its consumption. One such warning which, it may be added, is a representative as well as a comparatively recent one, reads as follows :—

"Upon entering the body, alcohol affects deleteriously the functioning power of every organ."

While it is not possible to examine the evil results of drinking on each and every organ, we can, at least, consider them so far as the more important ones among them are concerned. In this connection, we have to remember that our body is made up of billions of tiny units called cells. Each of these breathes, takes in food, does work and eliminates wastes. These cells are grouped into what we call the organs of the body. Each organ is made up of special cells which do a special kind of work. Not only that, even in one and the same organ, there are found clusters of cells, each engaged in doing its own special work.

For example, in the brain we find cells for thinking as well as cells which do other kinds of work. In

the stomach and intestines are found cells which prepare food for all the cells in the body. The function of the cells of the liver is to act as a depository and to destroy poisons. The cells of the kidneys secrete urine and eliminate the wastes of the body. The cells of the brain, however, though fundamentally identical in their composition with the cells of the kidneys, can never form urine while the cells of the kidneys can never learn to think.

Just as we can help the cells and, through them, the different organs into which they are grouped, by careful living and good habits, we can also damage and even kill the cells thus seriously impairing the efficiency of the organs, by taking injurious substances into our body.

We shall now try to ascertain how alcohol which was shown to be a poison in the last chapter, permeates each and every cell of the body thus injuring their well-being directly and that of the organs which are composed of them, indirectly.

Distribution of Alcohol in the Body

As the result of investigations as well as of observation, we have today a large mass of reliable information in regard to the absorption of alcohol in the body. As soon as any alcoholic beverage reaches the stomach, that organ pours out its secretions and dilutes the alcohol to about 4 per cent and the process of absorption commences through its walls. Unlike ordinary foods, it does not pass through any digestive process

so that its form is not changed. The rate of absorption becomes quicker as it passes into the intestines through the walls of which it finds its way into the blood. It has been established by laboratory tests that, "within three minutes after drinking a bottle of beer, the alcohol (contained in it) will show in the urine." In doing so, it has to pass into the blood, to be carried to the kidneys and taken out of the blood into the bladder. For all practical purposes, within thirty to sixty minutes, the whole of the alcohol taken is absorbed by the blood.

The rate of absorption, however, is conditioned by several factors. For instance, the rate of absorption is high if the liquor contains a large proportion of alcohol. Such is also the case if the stomach is empty when the drink is taken. Fatty foods appear to have a kind of affinity for alcohol and retard its passage into the blood. Similarly, if there is food in the stomach, the absorption is slow as compared with drinking on an empty stomach. But, on the whole, it is safe to assume that

"the maximum absorption of the alcohol in the blood occurs from one hour to one hour and a half after the drinking is finished."

After absorption into the blood, the alcohol is conveyed to the liver, then to the heart, where it mixes with all the blood of the body. The blood circulated throughout the body by the pumping action of the heart bathes every cell nearly twice every minute, carrying to it water, food and oxygen and

collecting the wastes. The alcohol-laden blood of the drinker is carried directly to each cell which is drenched by it.

Scientific research has not so far succeeded in determining the exact way in which alcohol interferes with cell activity but there is not the slightest doubt that drinking is like putting fine sand in the engine or salt water into a ship's boiler. Just as these may not instantaneously put the engine or the boiler out of action, but certainly will ultimately make them useless, similarly, alcohol which injures the cells immediately, damages our vital organs in the long run and that often irretrievably.

Digestion and Assimilation of Food .

The food we take is broken up by the teeth and mixed with the saliva after which it passes to the stomach which has a moist mucous lining with many small glands. Here it is churned around by muscles in the walls of the stomach until it is reduced to a pulpy mass. Simultaneously with this process, these small glands pour out their juices with which it is thoroughly mixed. When the stomach has completed its work, the soft mass goes to the small intestines where it is subjected to squeezing and is pushed onwards in its journey by their movements. Certain glands situated in the mucous lining of the small intestines which also manufacture digestive juices,

pour them out and these are mixed with the half-digested food on its journey with the result that, by the time the above work is completed, everything that the body can utilise out of what is eaten, is dissolved out of it and passes into the blood-vessels through the mucous lining of the small intestines. It is then carried to every part of the body to supply materials for growth, energy and repair while the part of the food rejected by the system as unsuitable for nutrition is eliminated.

The food we take consists of carbohydrates like rice, bread, vegetables, fruits, sugar, etc., fats like cream, butter, ghee, vegetable oils and proteins such as fish, lean meat, eggs, milk, pulses, beans, peas, etc., besides small quantities of certain important substances such as vitamins and minerals found in some foods.

The function of the saliva is to prepare the starch in carbohydrates for assimilation, of the gastric juice in the stomach to digest the protein part of the food, of the bile poured out by the liver in the small intestines to emulsify all fats so as to facilitate their easy absorption while the pancreatic and the intestinal juices take care of anything that the others miss.

It is therefore that the mouth, the stomach and the small intestines where food undergoes what may be called mechanical treatment as a preliminary to its chemical treatment by the different digestive juices, have been described as the kitchens of the body while the latter without the help of which it cannot be utilised have been compared to cooks.

Alcohol and Digestion

The process of digestion goes on without any unpleasant sensations so long as people continue to eat the proper kinds of food. But it is not so when injurious substances, one of which is alcohol, are put into the stomach. As soon as liquor is drunk, the glands inside the mouth which are irritated by what we may call a bath of alcohol, pour out saliva - to protect the sensitive covering of the tongue and cheeks and to wash out the mouth by facilitating the spitting out of the objectionable matter.

What happens when there is abnormally large flow of the saliva by reason of the irritation thus caused, is that it lacks an extra amount of the digestive element, ptyalin, so that, if taken with food, the starchy elements and the sugar in the diet, in almost every case, pass on to the stomach with an inadequate quantity of this essential chemical. In addition, as pointed out by Dr. Emerson on p. 69 of his *Alcohol and Man*, drinking tends to thicken the mucous membrane thus impairing the sense of taste.

There is an increased flow of juices in the stomach as soon as alcohol reaches it, Nature's device to protect its lining, until this irritating substance is disposed of in some way. The delicate mucous membrane loses its pink healthy colour and becomes red and inflamed with tiny blood spots here and there. In fact, it has the same effect as pepper or chilly powder would have on the lining of the nose.

Frequently, the habitual use of alcohol, even in moderation, is a contributory cause of stomach ulcers.

The lining of the stomach of the man who consumes large amounts of liquor is thick and has a leather-like appearance. In time, due to the injury suffered by them through the long-continued use of alcohol, the glands lose the power of pouring out as much gastric juice as they should. Some of them are so badly damaged that they stop working altogether.

The increased flow of gastric juice is lacking in pepsin as well as certain enzymes. Its abnormally large amount is therefore of little or no value for the digestion of meat, fish, eggs, and other proteins. This fact was referred to in that standard work entitled *Alcohol : Its Action on the Human Organism* published under authority by H. M. Stationery Office, London, where it is stated that,

"All the pepsin which the (gastric) juice contains has been washed out of the cells ; no further supply is formed by the action of alcohol. The increased amount of gastric juice is of little or no value to digestion."

The injury suffered under these circumstances by the stomach has been described in the following language by an eminent medical man :—

"Alcohol irritates the stomach lining causing an increased flow of mucous which tends to protect the lining, but when the flow is continued, gives rise to mucous gastritis or inflammation of the stomach."

Further, alcohol in the stomach retards digestion

by slowing down its churning action. The extent of the slowing down of digestion is conditioned by the quantity of alcohol taken. Investigations have shown that if enough liquor is drunk to reach 3 per cent or more of the stomach contents, the process of digestion is definitely retarded from twenty minutes to two hours. This was referred to by Dr. Holsti who said long ago,

"The majority of authors who have experimented along this line conclude that even small quantities of alcohol retard digestion and larger doses cause cessation of digestion."

An explanation offered for the slowing down of the process of digestion is that the muscles in the stomach gradually become feeble and flabby and, if drinking is persisted in, they

"become like a piece of used-up elastic, longer and thinner than originally, but with all their tone gone."

It is then that the drinker is turned into a patient with a dilated stomach. Though there are other causes of this disease, it cannot be denied that alcoholism is a contributory factor in many cases.

Under these circumstances, it is not surprising that the habitual use of alcohol, even in moderate quantities, should ultimately lead to gastro-intestinal disturbances and it is rarely that the drinker takes notice of them. This is because the diminished sensibility brought about by the action of alcohol on the central nervous system lessens feelings of discomfort and so lulls the apprehensions of the drinker

especially when he is reckless in regard to the amount of liquor consumed by him.

Disordered digestion is followed by symptoms generally associated with nervous breakdown. Muscular tremor is one of the earliest distinguishing features to appear. The hands are unsteady, the lips tremulous. The drinker is restless and irritable, sleeps badly and suffers from a sensation of prostration for the cure of which he has recourse to his favourite poison. There is mental weakness proved by his inability for sustained intellectual work. Judgment and will power are weakened and there is generally more or less failure of memory. Even where morning vomiting is absent, there is lack of appetite, the tongue is coated, the breath unpleasant and the whites of the eyes are often slightly jaundiced.

The disorders of the alimentary canal reflexly give rise to vaso-motor changes in the vessels of the face with the result that the minute veins of the cheeks and the nose become dilated and the complexion blotchy. In time, there is abnormal growth of the connective tissue leading to the huge bulbous nose familiarly known as rum blossom.

The Liver and Its Functions

The liver, situated in the upper right side of the abdomen and normally weighing three to four pounds, is composed of very large numbers of

microscopically small cells which carry out its different functions. Blood-vessels and bile ducts run between the masses of cells which are supported by connective tissue.

The blood circulating in the stomach and the intestines and carrying from them all nutriment obtained through the process of digestion, reaches the heart via the liver thus affording the latter an opportunity of dealing with it before being sent to the rest of the body through the blood.

The bile ducts to which reference has just been made, convey the bile made by the liver cells from the small sac known as the gall bladder where it is collected, to the intestines. The other principal functions of this vital organ of the body, so indispensable to life, may be summarised as follows. Rightly described as the great "chemical clearing-house of the body," the liver converts the excess sugar coming from the intestines after digestion, into a substance called glycogen re-converting it into sugar as need for it makes its appearance. Further, it oxidises poisonous substances such as alcohol, iodine and certain other drugs thus making them harmless and also neutralises toxins formed in the body or absorbed from the intestines. It assists in the making of the red colouring matter of the blood and plays a notable, though not as yet fully understood, part in the storage and utilisation of the vitamins so essential for the maintenance of health.

Effects of Alcohol on the Liver

As stated previously, one of the effects of alcohol on the mucous membrane of the stomach is to injure and thicken it with the result that the gastric juice is no longer normal and less of it is available for digesting food. This leads to the formation of large amounts of waste materials which place a heavy burden on the liver cells thereby injuring them through over-work. As they cannot always destroy the increased amounts of poison, the liver cells become swollen and damaged. The natural consequence is that this organ is not in a position to do its work in the way it ought to be done and the whole body suffers because of the poisons which are carried to every part of it through the blood.

Experiments have proved that the liver impaired by alcohol is injured by other poisons which have no effect on the normal liver.

Apart from the damage caused in the above manner to the liver through the disturbance of digestion in the stomach, alcohol causes unavoidable congestion in the great network of large and small blood-vessels thereby seriously reducing its ability to deal with food substances and to store up starchy foods in the form of glycogen. It also stands in the way of the proper production of bile and its systematic discharge into the intestines.

Alcohol which acts as a germicide can and, as a matter of fact, actually does kill cells including those

of the liver even in the diluted form in which it reaches them through the blood. Under its influence, they turn from their normal dark-red colour to pink and shrink, while many die without reproducing themselves. Thus the liver has a reduced number of cells all having lowered efficiency.

When the cells of the liver die, the connective tissues constituting the supporting structure of the masses of cells and blood-vessels, gradually fill up the space left by the dead cells. This inactive and low-grade tissue which takes the place of the dead and dying cells, contracts and presses upon the weakened liver cells thereby hastening their disintegration and death. The tragedy of the situation lies in the fact that this takes place at a time when, owing to the general lowering of vitality due to its impaired activity, the body, more than ever before, needs its most efficient service from the liver.

Occasional excessive indulgence in drink does not cause so much damage to the liver as when alcohol is taken regularly even though in what are regarded as moderate quantities. Taken in so-called moderation, the inefficiency of the liver causes lowered nourishment of the whole body, imperfect elimination of poisons and waste products, declining health and thence shortening of life.

Liver Derangements

After describing in a general way the injury inflicted on this organ by alcohol, we shall now

proceed to refer to some diseases of the liver directly attributable to it. In fact, alcohol has been regarded as so prolific a source of liver troubles that persistent ill-health and, indirectly, even death from the diseases referred to below are almost universally assumed to be due to its use.

Before, however, saying anything about them, a matter to which the attention of the reader has to be drawn is that diseases of the liver are found oftener among those who, without actually reaching the stage of intoxication, take small doses of alcohol than among people who indulge in excessive drinking at long intervals. The correctness of this view is proved by the well-known fact that the largest number of deaths from liver diseases occur among inn-keepers who are often "treated" by their patrons and among commercial travellers who generally close a bargain with a drink.

When taken in moderate amounts, alcohol is, to all intents and purposes, entirely absorbed by the blood-vessels in the walls of the stomach and is, in consequence, carried straight to the liver. As the first organ to bear the brunt of the onset of alcohol, it is the one to show its injurious results in the clearest manner. This takes the form of the dilatation of the blood-vessels of the liver unavoidable because of its richness in them. This engorgement makes the liver heavier than normal when it is popularly known as "Beer Drinker's Liver" under which circumstances it stretches, though slightly, its covering membrane. These two combined cause a sense of local weight.

and discomfort which the sufferer rarely thinks of associating with his habit of drinking. The condition of liver engorgement referred to above occurs almost universally in the early stages of drinking.

In most cases, the habitual drinking of excessive quantities of liquor as well as the regular use of moderate amounts of alcoholic beverages lead to swelling in the liver cells which causes them to take up more room so that the whole liver is enlarged. If drinking is persisted in, fat is deposited, within the cells of the liver and the patient comes to suffer from what is called "fatty liver." It is estimated that this unhealthy condition is found among nearly 75 per cent of habitual users of alcoholic beverages.

Before proceeding further, it seems necessary to make some reference to cirrhosis of the liver generally regarded as "the alcohol disease." The most recent view of competent medical authorities seems to be that what we may call true cirrhosis of the liver is not confined exclusively to those addicted to alcohol. At the same time, it is also agreed that it occurs more commonly among chronic alcoholics than among the general population, clearest possible indication of an association between inebriety and this dangerous disease.

The intimate connection between drinking and cirrhosis was referred to by Dr. Norman Joliffe, Associate Professor of Medicine, College of Medicine, New York University, when, in his lecture entitled "The Nutritional Aspects of Alcohol" delivered in

the Summer Course on Alcoholic Studies at the Yale University in 1943, he said,

"If a patient with cirrhosis of the liver is said by a doctor to be non-alcoholic, it is due usually to the ability of the patient to fool the doctor. Patient after patient is transferred to Bellevue from other hospitals as 'a very interesting case of non-alcoholic cirrhosis.' Looking up the records, we find that they have been in the alcoholic ward again and again. So far as my experience is concerned, 99 out of 100 patients who have this disease have developed it secondary to drinking too much. They may not have been drinking when admitted to the hospital, but they were doing so earlier. We see so many in New York who have been diagnosed as non-alcoholic, who deny ever having taken more than an occasional drink, but who have records of frequent admissions to our alcoholic wards."

Careful and brilliant experimental work by America's foremost authorities on cirrhosis of the liver has shown that "a transition from a fatty liver to cirrhosis of the liver is not only possible but actually occurs." This is what makes "fatty liver" so dangerous a thing.

A peculiar characteristic of the comparatively useless connective tissue referred to previously is that it tends to contract, in other words, to get smaller. As it forms in bands and patches especially round the blood vessels, their contraction causes the liver to shrink not all through but only in places so that portions are left protruding. It is then that the patient is said to be suffering from a "hobnailed" liver, because of the knob-like projections on its surface.

The shrinking of the liver which is the real cause-

of "hobnailed" or "drunkard's" liver, presses still further upon the liver cells and interferes with the work they should do. Further, it presses upon and reduces the size of the vessels which carry the blood to the liver. This is accompanied by obstruction of the bile ducts. Reduction in the size of the blood-vessels leads to the damming back of blood throughout the entire digestive tract whence follow digestive disturbances. It is then that the watery part of the blood begins to ooze out of the blood-vessels into the abdomen causing dropsy.

As regards the symptoms which make their appearance as the derangement of the liver proceeds from the less to the more serious form, it may be stated that interference with the amount and quality of the bile produced under abnormal conditions insensibly leads to indigestion and constipation. Similar interference with the action of the liver cells together with the changes they undergo through the influence of alcohol, ends in many cases with gouty conditions accompanied by mental depression or irritation. Swelling of the liver causes discomfort, pain and sometimes jaundice while contraction of the organ produces dropsy and swelling of the veins.

Alcohol and the Kidneys

Broadly speaking, the kidneys may be said to be an elaborate and very active filtering system consisting of thousands of separate units placed side by side

whose function is to remove from the blood and to carry away the poisonous products of the body which, if retained, would so seriously interfere with the vitality of all the tissues of the body as to ultimately and inevitably end in death. Reference may be made here to certain experiments conducted at the world-famous Battle Creek Sanitarium, Michigan, U. S. A., under the supervision of Dr. William Harvey Kellogg. It was found that, under the influence of alcohol, the efficiency of the kidneys in eliminating body poisons is reduced by as much as 50 per cent, the percentage of reduction depending on the quantity consumed. It is hardly necessary to add that this must lead to comparatively early death encouraging as it does the appearance of many functional and organic diseases.

Anything that interferes with the work of the kidneys will not only cause retention of the waste products of the system but will permit the loss of the valuable albuminous substances of the blood. Alcohol has this effect on this important organ of elimination and that to a degree which can best be described as disastrous. It is therefore that the kidneys cannot be too carefully safeguarded.

That the appearance of albumin in the urine is very often due to drinking and that its loss in this way by the system can be reduced and often ended by giving up alcohol were proved by certain investigations carried out by Dr. Francis Hare, Medical Superintendent of the Norwood Sanatorium for the Treatment of Inebriety.

The three principal changes due to drinking may be summarised as follows :—cloudy swelling of the cells lining the small tubes constituting the filtering system, fatty degeneration of these cells and, as in the case of the liver, increase of fibrous tissue under the influence of alcohol followed by the shrinkage of the kidney. The excretion of the urine is reduced in proportion as the kidney shrinks ; finally the condition known as chronic Bright's disease appears and this inevitably ends fatally.

The three-fold degeneration mentioned above interferes with the work so much that, as a consequence of the deficient action, the body falls a prey to numerous physical ailments such as rheumatic pains, mental depression, loss of appetite, sickness and other symptoms of faulty digestion. The amount of damage sustained depends on the quantity of alcohol taken. As long ago as 1894, it was pointed out by Bollinger that these degenerative changes are to be found even in the organs of so-called moderate drinkers.

In March, 1901, Dr. J. M. Whyte stated in the *Edinburgh Medical Journal*, "Alcohol in moderate quantities irritates the kidneys" and also that it "should be withheld" in kidney diseases. This merely confirms the view of the discoverer of Bright's disease who held that it is "largely due to taking alcohol." While it is not suggested that every case of Bright's disease is due to drinking, it is nonetheless a fact that it is more likely to prove a menace to

drinkers rather than to abstainers. This is corroborated by the view expressed by a famous English specialist who, basing his views on experience gathered in the course of his own practice, stated that,

"As much as seven-eighths of all cases of diseases of the kidneys are traceable to alcohol."

CHAPTER IV

ALCOHOL AND THE VITAL ORGANS (II)

The heart, probably our most important organ, is, fundamentally, a strong muscular pump forcing on and drawing in fresh supplies of blood by alternate contraction and expansion. Its peculiarity is that it starts its work from the time life begins stopping only with its end. The only rest it gets is about half a second between the beats and yet this is enough to keep it going, provided it is treated reasonably. Unfortunately, many fail to do so as, for instance, by eating too much, taking insufficient exercise, staying up late and drinking alcoholic beverages.

Alcohol, a Heart Depressant

The popular belief that alcohol is a stimulant of the heart strengthening and enabling it to perform its functions perfectly and arousing it to additional activity, rests on the well-known fact that there is always a slight increase in the pulse rate after drinking. This explains its use in such emergencies as fainting or shock. The scientific explanation of this phenomenon is that the heart muscle is controlled by an accelerator and an inhibitor nerve which, normally, act against each other thus keeping the pulse steady by preserving the delicate balance between them. Alcohol, fundamentally a depressant, does not act as

a positive stimulant to the accelerator but relaxes the inhibitor nerve by its narcotic effect with the consequence referred to above.

As the result of certain investigations carried out in the biological laboratory of the John Hopkins University in regard to the so-called stimulant action of alcohol on the heart, it was found that

"Blood containing only one-quarter per cent of alcohol diminished within a single minute the work done by the heart, and that blood containing one-half per cent so seriously affected its working power that it was scarcely able to drive a sufficient amount of blood to supply its own nutrient arteries."

Subsequent investigations carried out on similar lines proved that

"Alcohol has not the augmenting power formerly attributed to it, but that, on the contrary, it slowly depresses the action of the heart-muscle, and ultimately partly paralyses not the muscle only but also the delicate nerves which are present in the wall of the heart."

It was also observed that

"This paralysis of the cardiac nerves largely accounts for the acute dilatation of the heart and the fatal failure of that organ, which often occur when people have drunk large doses of alcoholic liquids."

The correctness of the opinion that alcohol is a depressant of the heart is borne out by what appears on pages 76 to 77 of the report of Lord D'Abernon's Committee published under the title of *'Alcohol and the Human Organism'*, where it is said,

"No scientific ground has been discovered for any claim made on behalf of alcohol to practical value as a direct stimulant of the

heart. The popular idea that alcohol is a stimulant proves on examination to be scientifically untenable."

The accuracy of the above view was accepted when medical men in charge of heart hospitals gradually refrained from prescribing alcohol for their patients and also when surgeons stopped ordering it in the treatment of shock after operations where there is much loss of blood.

Drinking and Derangements of the Heart

Immediately after the disappearance of the initial effects of drinking, alcohol tends to weaken the action of the heart. As a depressant of muscular action, the heart being nothing but a muscle, this is what may be expected from alcohol which, the investigations of Lombard in 1892, and those of Hellesten in 1904, showed, has the power to reduce muscular work by 6 per cent below normal within half an hour after taking a small dose of it. So long as alcohol is not eliminated, the heart may be said to suffer from weakness which may be regarded as of a temporary nature. It fails to contract thoroughly with the result that there is, what we may call, a certain "damming up" of the blood. Under the circumstances, the heart becomes over full with blood and its walls are stretched.

If the drinker indulges in alcohol at fairly long intervals, the heart is given an opportunity to recover from the strain to which it has been subjected. The overcoming of the strain is facilitated when a moderate

quantity of liquor is taken. The position becomes more serious if the person continues to indulge in liquor thus exposing the heart to continuous stretching with a serious weakening of the muscles in its walls. It then becomes dilated, a condition found in the large flabby heart of the chronic beer drinker.

The weakness of the heart muscles consequent on dilatation of the organ, prevents it from emptying itself properly so that its work is increasingly hampered through its overfullness. The blood circulation throughout the body is hindered leading to injury of all the organs. Owing to the especial situation of the abdominal organs and the way in which the circulation of the blood takes place in them, the liver, spleen, stomach, etc., become congested with vinous blood charged with waste products of the body. The accumulative or back-flow effect which appears, tells immediately and primarily on the liver.

Further, any noticeable weakening of the heart results immediately in a slowing down of the circulation thus leading to partial stagnation of the blood over the whole body. The natural consequence of this state of things is that the cells are deprived of their supplies of nutrition of which they stand in constant need and, as a result of receiving inadequate quantities of food, they naturally undergo a process of deterioration. The malnutrition which follows reduces still further the strength and efficiency of the heart which is a most serious matter in view of the very difficult task it has to perform all through life

and which it can accomplish satisfactorily only if its supply of blood is perfect and its muscles well-nourished.

As the weakened and dilated heart fails to exert the proper amount of pressure on the blood in the blood-vessels, they suffer from a state of chronic distention with results described hereafter.

It is a well-known fact that alcohol encourages the deposit of fat in places where it should not be found and causes an excess where it is usually found. Normally, there is always some fat on the outside of the heart which alcohol tends to increase. Further, it also promotes the deposit of fat in the heart itself. Acting as a direct poison on the heart muscles, alcohol causes the muscle fibres to become slightly swollen. There is an increase of the fibrous tissue between them and, if drinking is persisted in, they become impregnated with fat. There is thus a two-fold clogging of the action of the heart; it is weakened by the fat in the muscle itself and is hindered from carrying on its normal work by the fat outside.

The fatty and dilated heart produced even by moderate drinking in the different ways mentioned above, is liable to give way under ordinary muscular strain or under the attack of diseases not ordinarily dangerous to the total abstainer because alcohol makes it dilate suddenly and fatally. Such cases, owing to the suddenness of death, are often the subjects of inquests. The coroner's verdict almost invariably

refers merely to the heart being diseased but very rarely mentions the real cause—alcohol.

Reduced Heart Power and Premature Death

Those habitually consuming alcoholic beverages in small amounts for years, often suffer from lack of energy. They find that they regain their former vigour and freshness only after total abstinence lasting for a few months. This is because it affords the heart a much-needed opportunity to regain its tone. Not many moderate drinkers realise that the constant repetition of even very small doses leads, in the long run, to weakness of the heart. The result in many cases of such lowering of the efficiency of the heart is that when they are attacked by some disease, instead of being able to hold their own and to recover from their illness, they succumb readily to heart failure. This is held to account for the large number of deaths of men in their prime who would otherwise have lived to a good old age, but who are heavily handicapped when attacked by such diseases as influenza or pneumonia. In this connection, the attention of the reader may be drawn to the following extract from *Alcohol and Old Age* written by Sir Hermann Weber, M.D., F.R.C.P., etc., .

"It has been shown, as well by experiments on animals as by observation on man during life and after death, that alcohol weakens the heart, causes hypertrophy and dilatation and fatty degeneration of the muscular fibres, and that it thus increases the natural tendency to failure of the heart which is usual in old age.

Alcohol, by augmenting this tendency, adds to the danger arising from acute diseases, such as influenza and pneumonia, since persons with weak hearts much more readily succumb to such disease than persons with strong hearts."

The death of such men is a loss to the society to which they belong for, at that age when their powers of body and mind are at their best, they should be of real value either as work-producers, teachers or thinkers. Only too often in the West and, it has to be added regretfully, in India among those who are imitating western methods of living, is the efficiency of such people impaired and their normal resistive powers to disease and death diminished by what is erroneously regarded as the ordinary dietetic use of alcoholic beverages.

Description of Blood-Vessels

The circulation of the blood depends not only upon the heart, the great force pump which causes the normal nine pounds of blood to make two complete circuits of the body every minute thereby supplying the cells clamouring for food with nutrition and, at the same time, collecting and carrying away the waste matter thrown off by them, but also upon the blood-vessels or channels through which it passes. These may be said to begin in the aorta or main blood-vessel which carries the pure blood to the body through a number of little tubes called arteries.

Arteries consist of the following three principal parts :—there is first, an outer layer of what is known

as connective tissue acting as a general support and shield, next comes a somewhat thicker middle layer composed of muscle with a band of elastic tissue which assists the muscular action permitting the blood-vessel to enlarge and contract according to necessity thus giving it a certain amount of what we may call "spring" and, lastly, the innermost or central layer called the lining membrane consisting of a very thin and exceedingly sensitive layer of cells providing a smooth passage for the blood.

If we follow an artery through its course, we find that, gradually, the first and second layers consisting of the connective, the muscular and the elastic tissues disappear, until at last only the thinnest possible network of tubes imaginable is left. Invisible to the naked eye, these consist of nothing but a single layer of the same cells which form the lining membrane. These thin tubes called capillaries are to be found all over the body and it is through them that the blood is brought into the closest possible contact with the tissues.

After it has done its work of supplying food to and removing wastes from tissues, the impure blood passes on to another set of blood-vessels called veins which, much like the arteries, gradually grow larger until at last they form into a large vessel which opens into and allows the blood to enter the right side of the heart whence it is passed on to the lungs for purification.

Alcohol and the Blood-Vessels

It has been pointed out already that as soon as alcohol is taken, it irritates the sensitive blood-vessels of the stomach and dilates them. Almost simultaneously, the liver becomes turgid and swollen causing dilatation of its blood-vessels. Immediately after alcohol reaches them, the same thing also happens in the case of the other organs of the body. Repeated drinking of alcoholic beverages has the effect of making this dilatation more and more permanent so that as the flow of blood through these permanently enlarged channels becomes naturally slower, one reason for this being the impaired action of the weakened heart, a condition of stagnation, known as chronic congestion, makes its appearance. With its establishment in any part of the body, the chemical changes between the blood and the tissues fed by it are so seriously upset that they begin to undergo the initial stages of fatty degeneration which may be regarded as the first injury undergone by them.

Dilatation of the blood-vessels and the resulting congestion are not, however, the only injury caused by alcohol in the thousands of blood-vessels found in every part of the body. In addition, a great change for the worse takes place in their walls, a deterioration directly traceable to the habitual use of alcoholic beverages.

The thickening of the walls of the blood-vessels.

of many persons has been ascribed by competent medical authorities to an increase in their normal fibrous tissue. In some cases, this is accompanied by a condition of fatty degeneration and also even of calcification of the vessel-wall. Professor G. Sims Woodhead, M.A., M.D., F.R.C.P., F.R.S.E., who conducted investigations on this matter more than four decades ago, stated that

"In certain cases at any rate, it (this condition of the blood-vessels) can be attributed to nothing but the use of alcohol, and not always necessarily in very large doses."

Blood can feed the cells only because of its power to filter rapidly to them through the walls of the blood-vessels. Body wastes again cannot be removed by it unless they can easily and readily pass through them. It has been stated previously that the vessel-walls tend to become thick as soon as degeneration in them makes its appearance. The result of such a state of things is that "the active transference of liquid through them being more or less prevented, the nutrition of the body is gravely hampered," which may be regarded as the second injury indirectly resulting from the damage inflicted on the blood-vessels by the use of alcohol.

The above mentioned fibroid thickening leads to a want of elasticity and contractility in the walls of the blood-vessels, to a delay in the circulation of the blood and, thence, to a state of stagnation which may be regarded as the third injury suffered by them.

As the consequence of the stagnation of the circu-

lation just mentioned, a larger amount of work has to be done by the heart which, for the maintenance of life, has to pump the blood to every part of the body. Under these circumstances, the heart is compelled to use up its reserve power and energy thereby reducing its chances of giving longer service. The seriousness of this fourth injury invited by the use of alcohol was pointed out by Sir Hermann Weber, M.D., in his well-known book *On Means for the Prolongation of Life*, in the following terms,

"Persons consuming large quantities of beer mechanically over-tax their blood-vessels by keeping them in a state of distension, which gradually leads to the disease of the small arteries, and, later on also, of the heart, the work of which becomes additionally more and more increased by the morbid state of the blood-vessels."

Alcohol and Arterio Sclerosis

A great physician has called the blood-vessels "vital rubber." Just as rubber kept permanently stretched gradually loses its elasticity, becomes brittle and breaks easily, similarly the blood-vessels become hard instead of pliable, inelastic and brittle instead of flexible. Under the influence of alcohol, the blood-vessels become less and less able to adjust themselves to the constant variations in the pressure of the blood within them till, finally, they become incapable of withstanding that pressure. Under these circumstances, they frequently rupture producing haemorrhages and apoplexies which generally end fatally in the long run.

While age, over-eating, gout, syphilis, lead poisoning and chronic over-strain of any sort may give rise to the disease of the blood-vessels called arterio sclerosis, all competent authorities are agreed that alcohol is one of its main causes.

If a normally healthy man has used liquor without apparently injuring his health in his youth, he cannot continue doing so with impunity after he reaches middle age when there is a marked reduction in the resistive powers of the body. It is therefore that Professor Sims Woodhead stated that if such a man continues to take alcohol in what is often called "moderation" he, instead of living to eighty or ninety years as he should, is liable to die very much earlier from degeneration of the blood-vessels and failure of the heart.

After the above sketchy and popular description of the damage inflicted by alcohol upon the stomach, the liver and kidneys, the heart and the blood-vessels, it does not seem necessary to deal with its effects on the pancreas and other organs and glands. Suffice it to say that even without considering its effects on the blood and the brain, matters considered later on, the damage it causes to that wonderful cell-complex we call the human body is in no way different from the injury it inflicts upon the most elementary of cells.

The Ultimate Result

The effect of the alcohol circulating in the blood upon the different organs of the body has, very |

happily, been compared to that of a current of water in the bed of a stream in which lie a granite boulder, a limestone ledge and a sandbar or a bank of mud. The first will, in most cases, remain unchanged, the second will be partly worn away and the third will completely disappear, the discrepancies in these cases being due to the difference in the materials acted on rather than to the water itself. In the case of alcohol, all that has been sought to be proved is that, as a poison, it injures the cells of the body and it is maintained that its effects are to be found in those organs most susceptible to it. According to their sensitivity to this poison, alcohol may affect the stomach, the liver, the kidneys, the heart, the blood-vessels or other organs. In all cases, normal physical activities are disturbed, structure is impaired, and the way paved for degeneration and death. The explanation for this as given by a competent authority is as follows :—

"The changes are everywhere of the same general type ; the tendency is to destroy the higher form of cells and to replace them with connective which does not do the work,"

than which there cannot be a stronger and more damaging indictment against this dangerous enemy of humanity.

Apparent Immunity

It is a well-known fact that some habitual users of alcoholic beverages gradually develop a degree of tolerance which they regard as a desirable state of

things. This is because of the ability of the system to accommodate itself to poisonous substances especially when they are taken in slowly increasing quantities over a long period.

It should not, however, be forgotten that, after everything has been said and done, great tolerance indicates an unnatural state and merely signifies that the body can somehow manage to overcome the poison. Tolerance must not be confused with immunity and there is, naturally enough, a limit which cannot be transgressed with impunity and, once that is reached, the price for defying the laws of Nature has to be paid in the shape of impaired health, disease and early death due to the damage suffered by one or other of our vital organs.

CHAPTER V

ALCOHOL AND THE NERVOUS SYSTEM (I)

The two main body systems in the order in which they have been treated in the last two chapters are the digestive system which prepares different kinds of food-stuffs for assimilation and the circulating system of blood-vessels consisting of veins and arteries of which the heart is the great force pump carrying the blood to every part of the body. The third, equally important, proposed to be treated here, is the marvellous and highly complex though somewhat frail nervous system with its seat in the brain, its main distributing channel the spinal cord, and the network of nerves carrying messages to and from every part of the body.

In what follows, an attempt has been made to assess the long term effects of alcohol on the nervous system as well as to give some account of ailments of nervous origin generally attributed to it.

As the effect of alcohol on the components of the nervous system can be properly estimated only if we possess clear ideas in regard to its structure, the correlation of the parts to one another and their diverse roles, it seems desirable to start with a short and popular description of the nervous system and its functions.

Main Divisions of the Nervous System

The nervous system has been slowly and painfully developed from the humblest beginnings so that man may be able to adapt himself to all the chances and changes in the environment in which he has to live. We are filled with astonishment when we think of the successful way in which he has been enabled through its help to survive in this world when other and far more powerful members of the animal kingdom have failed to do so.

Every one of our movements, every sensation, the beating of the heart, the action of the lungs, the operation of the different glands and organs of the body are controlled by the nervous system. In addition, it is through it that we do our thinking which involves all the higher functions such as reason, judgment and self-control differentiating man from and making him superior to animals.

For our purposes, the nervous system may be divided into the following main divisions :—Nerves, Spinal Cord, Medulla Oblongata, Cerebellum and Cerebrum. All parts are linked with one another, there being nothing like a break between them. The centre of the system as a whole is the brain consisting of the Cerebrum and the Cerebellum, and the Spinal Cord with the Medulla Oblongata which form what is called the central nervous system. Messages are carried to and from them by the nerves.

Before proceeding further, it has to be stated that

though, for purposes of convenience, the nervous system has been broken up into a number of units and though each one of them enjoys, so to say, a certain amount of autonomy and initiative, the successful working of the nervous system as a whole depends on their orderly co-operation under the guidance of the individual through the highest parts of the cerebrum.

Nerve-Cells, Nerve-Fibres and Nerves

All the different parts of the nervous system are composed of the same highly specialised type of protoplasm in the shape of very small nerve-cells and nerve-fibres lodged in a supporting tissue acting something like a framework for their safe retention in their proper place. Though varying from one another according to the function they are called upon to discharge, these nerve-cells and nerve-fibres are all constructed on the same plan. It is therefore that we may take nerve-cells as the basis of the nervous system, the more so because all the nerve-fibres in the body owe their origin to them.

The nerve-cell consists of a protoplasmic body arranged in small masses grouped round a central body called the nucleus. It gives off many branches and one special fibre of exit. A set of fibres called processes from each cell forms something like a network with a set from an adjoining one. They do not actually join but rather embrace each other without actually coming into contact. It is at this

junction called synapse that the message received by the brain from one set of nerve-fibres is switched off to another set of nerve-fibres.

The nerve-fibre is composed essentially of a very fine thread of protoplasm which, in many places, possesses either no insulating sheath at all or an extremely thin one. Elsewhere, it consists of a central part known as the axis cylinder which is always connected with a nerve-cell. This is covered sometimes with one and sometime with two sheaths. It has therefore been compared to an insulated copper wire, the axis cylinder being the wire and the sheaths the wrapping.

The nerve either carrying messages to or from the brain, medulla or spinal cord is composed of a number of nerve-fibres bound together by connective tissue. This runs between and around individual nerve-fibres wrapping them into something like a bundle.

The Spinal Cord

That particular part of the nervous system which is enclosed within certain very strong membranes inside the canal formed by the 29 bones constituting the vertebral column is known as the spinal cord. About a foot and a half long in the normal individual, it runs from the lower part of the back right up until it joins the brain. From it run off 31 pairs of spinal nerves going in various directions to the body and limbs on either side.

An illustration representing a cross section of a portion of the spinal cord will show that it has a dark central part resembling roughly in shape the letter "H" known as the grey matter and that the rest of the cord is composed of white matter. The former is made up of a mass of nerve-fibres running in various directions with a number of large nerve-cells surrounded by and, so to say, embedded among them.

Each of these, as in the case of nerve-cells in general, gives out a number of processes or branching fibres and one well-marked fibre which runs straight out into the front or anterior root of the spinal nerve where it becomes the central part or, in technical language, the axis cylinder, of a nerve-fibre. The anterior root, therefore, is composed of a bundle of fibres derived from these large cells.

The posterior root consists of a bundle of fibres running up towards the cord joining on the way special cells which, in small collections, are called ganglia. From these, they pass into the grey matter of the cord after which they chiefly turn upwards conveying sensations to the brain. The white matter is composed of bundles of nerve-fibres running up and down the spinal cord. They link up its various sections conveying sensations to and messages from the brain.

It thus follows that the spinal cord is composed of cells and fibres making up the grey and white matter. Each spinal nerve consists of a front and a back portion known respectively as the anterior and post-

erior roots. It is through the nerve-fibres in the posterior roots that impressions and sensations from the body are transmitted to the brain while messages are carried from the brain to the muscles through those in the anterior roots. This explains why every spinal nerve is composed of sensory and motor fibres bound together in the same sheath.

The Medulla Oblongata

We shall now deal with that part of the nervous system which lies between the upper end of the spinal cord and the brain. This is nothing but a continuation of the spinal cord which, passing through an opening in the skull, enlarges and forms what is known as the medulla oblongata. Though a very complicated structure, it will be enough for our purpose if we remember that, like the spinal cord, it is made up of grey cells and white fibres, that the former receive or send out messages and impulses, that the latter act as their transmitters and, finally, that it is the channel through which thousands of nerve-fibres pass "conducting messages from the higher part of the brain to every part of the body."

Life depends on the circulation of the blood, breathing and digestion and these, in their turn, depend on the health and well-being of small colonies of grey cells called vital centres situated in this important part of the nervous system. Though affected adversely by various influences, these grey cells are remarkably resistant so much so that, in the

case of the lower animals, they continue to work even after the higher part of the brain has been destroyed. In the case of man, death results when any serious injury or disease of the higher brain interferes with their action. Nonetheless, their toughness is evident from the fact that the vital functions go on during sleep, under the influence of an anaesthetic or when dead drunk.

In all such cases, the mysterious influences which we speak of as life are operating and, under their impulses, the heart beats the inhalation and exhalation of air by the lungs go on and other functions proceed. The only explanation we can offer is that God has endowed these masses of grey cells with the wonderful power of sending out energy which is transmitted to the heart and other organs producing results perceivable by all.

The Cerebellum

The cerebellum or small brain works in perfect co-ordination with the cerebrum, the medulla oblongata and the spinal chord. Impulses come to it from eyes, ears and, in fact, from all parts of the body. They are passed on to the cerebrum and so we become conscious of our position. One of its principal functions is to co-ordinate these various impulses and therefore the unhindered activity of the cerebellum is essential for the accurate execution of any movement,

Even such an apparently simple thing as main-

tenance of the erect posture for which a large number of muscles have to be directed and kept up to their work of controlling the balance of the head and the erectness of the back, is an easy matter only with the help of this organ. It is hardly necessary to add that, looked at from this angle, walking is a much more complex movement demanding much practice and dependent literally on a flood of incessant and varied messages from the brain to direct correctly the constantly altering position of the legs and feet.

The Cerebrum

When we talk of the brain as a whole, what we are really thinking of are the cerebrum or large and the cerebellum or small brain both of which are located inside the skull which, where the adult is concerned, is sufficiently strong to protect them from ordinary damage.

The cerebrum with which we are concerned here is composed of innumerable extremely sensitive cells in the grey matter and fibres in the white matter almost identical with those mentioned previously, all of them being made up of a protoplasm. All the former are provided with a number of rootlets and are brought into close co-operation with one another and, along with the fibres, are kept together by a supporting substance. They are nourished by a set of minute blood-vessels which run into the substance of the cerebrum and bathe its exterior through the *pia mater*, a thin membrane covering it and lying in close

contact with all its folds. The whole of the brain and the *pia mater* are, in their turn, bathed in a thin layer of fluid underneath a second covering between the brain and the skull called the *dura mater*.

The necessity for the large and free supply of healthy blood to the cerebrum is a matter which must never be lost sight of because first, it is needed to keep the delicate nerve tissues supplied with the nutriment essential for their vitality and for the steady and continuous provision of the stream of energy constantly rising from the nerve centres and secondly, because any poison such as syphilis or alcohol circulating in the blood cannot but have an immediate and direct adverse effect on the brain cells.

As the highest, the most complex and the most important part of not only the nervous system but also of the whole body, the cerebrum is the dominating organ in human beings. This is clear from the many different kinds of service rendered by it and which have been summarised in the following terms by Dr. C. C. Weeks, M.R.C.S., L.R.C.P., on page 46 of the second part of his *Scientific Authority for Total Abstinence*.

"First, it receives the impressions from the special sense organs, as we call them, in the ear, eye, nose, mouth and skin, whereby we become conscious of sound, sight, smell, taste and touch (or pain).

"Secondly, it sends out messages whereby the muscles and glands do their work in response to our various desires to move, speak, direct our gaze, etc.

"Thirdly, it stores up impressions of these sensations, which can be recalled to mind in the exercise of memory.

"Fourthly, it provides the apparatus whereby we form habits, good or bad, and whereby we 'can break a habit' once it has formed.

"Fifthly, it provides a most remarkable apparatus, through what are called 'association fibres,' whereby these various parts and functions can be linked together so that the individual can use his brain, as a whole, for the carrying on of his intelligent life.

"Sixthly, it provides for the exercise of judgment, understanding, reason and self-control whereby, in co-operation with God, the individual can get the best out of his life, guide the formation of habits, and bring the lower animal instincts under intelligent moral control."

Sensori-Receptive Centres

The investigations of a large number of scientists among whom mention may be made of such people as Gowers, Horsley, Ferrier, Jackson, Sherrington, Schafer, Hitzig and Fritsch, have enabled us to say with ever-increasing certainty that the grey cells referred to previously are arranged in well-defined groups, known as "areas" or "centres" for the performance of the various functions outlined above. Experiments on animals and observations of human beings have shown that any injury to or disease of a particular area results in well-defined and clear-cut signs and symptoms, such as loss of power, loss of speech or some other defect according to the part damaged. At the same time, it must not be forgotten that, under conditions of everybody life, the various

centres are inter-dependent and, as a whole, work together in co-operation.

Without entering into any details, it may be said that, generally speaking, we have what are called the sensori-receptive centres which may be said to occupy the hinder and lower part of the cerebrum. They receive impressions from the eyes, ear, nose, mouth and skin. Then there are other areas for receiving special spatial sense impressions as well as others concerned with speech, with word formation as the result of hearing or reading.

Sensori-Motor Centres

Then we have the sensori-motor centres located in the middle region which issue orders to the muscles for the execution of movements. In addition, the memory of movements and muscular strains are recorded and stored up by them. Beginning above and passing downwards are found centres for the leg, trunk, arm, face, movements of eyes and vocal speech. If any of them is irritated by disease, as for example by a tumour, or by drugs such as alcohol, convulsive movements of the corresponding part of the body are liable to occur.

As the centres which control their respective muscles attain maturity only when adulthood is reached, complete control over them is acquired gradually through training lasting all through the years of growth and development. By way of illustration, we may think of how the child gradually

establishes control over the muscles of the lips and tongue used for speaking, through a long and arduous process of imitating and failing and trying again, speaking more clearly and more quickly till the precious faculty of speech is acquired in all its perfection.

This experience has to be undergone in the case of all movements and once they have been learnt, the cells retain the power, provided practice is kept up, of responding promptly to the will of the individual.

Association Centres

In our everyday life, hand and eye as well as other parts of the body have to act together whenever any work has to be done or any movement made. This is possible only because the various association centres are connected together in a very wonderful manner by a complicated series of nerve-fibres running in various directions. It is largely due to this arrangement that we can use the parts of our brain for carrying out any particular action. Again, it is owing to this that we can connect and recall the memories and experiences preserved in the different cells of the brain. While these associations are being gradually set up from the dawn of childhood, it is understood that, from the age of about twelve to about thirty, there is a marvellous development of these association fibres through the agency of the very delicate and very sensitive nerve-cells in the brain and that it is during this period especially that nothing

which tends to hinder this great work of Nature should be introduced into the body.

In the lower animals, impulses lead to action, and on the whole, it may be said that they act instinctively on the impulse of the moment. On the other hand, instincts are controlled or, at least, may be controlled much more thoroughly and completely by human intelligence. What is implied is that while man may be conscious of the different impulses which come to him, he can and does use his judgment to curb and control them should his intelligence tell him that this is necessary either for his good, for the good of his family or for that of society.

It is presumed that the controlling action of the front part of the brain is responsible for attention, concentration as well as for much of what we call intelligence. The great and fundamental characteristics of man's brain which mark him off from animals are his higher intelligence, his power of judgment and his self-control of which more hereafter.

Alcohol, Nerve-Cells and Nerve-Fibres

After the above very sketchy description of the nervous system, we shall proceed to ascertain the injury inflicted on it by alcohol. But before doing so, we should remind ourselves that though there are millions of nerve-cells and nerve-fibres which make up the nervous system and though they serve different purposes, the fullness of life, so far as man

is concerned, depends entirely on the health and well-being of each individual nerve-cell.

It does not matter whether a man drinks because he likes liquor, dislikes the idea of disobliging his friends in whose company he may find himself, or because he thinks that alcohol will renew his energies, the result is always the same,—he comes under its influence. And when this happens, it means that alcohol which passes unchanged almost immediately from the stomach to the blood and which, even when taken in very small amounts, does not disappear altogether for about four hours, bathes every cell and every fibre with it every thirty seconds. The expiry of the four-hour period referred to just now, does not see the end of the injury because the deleterious effects of alcohol last much longer on account of the slowness with which the system makes a recovery.

Autopsies conducted on moderate drinkers immediately after their death just previous to which they had taken an ordinary dose of alcohol or other narcotic, do not reveal any definite physical change in the cells. This, however, does not mean that moderate drinking can, as generally taken for granted, be indulged in without injury for it is a well-established fact that

"the function of nerve-cells and nerve-fibres can be seriously interfered with without showing any immediate signs."

Under these circumstances, the cells do not at first show any marked change. This makes its appearance if and when the man persists till his drinking becomes excessive. To distinguish between

the two, one has only to remember the case of the moderate drinker who staggers because alcohol has affected his nerve-cells and his nerve-fibres, etc., and the dipsomaniac whose nerve-cells, under the microscope, are found to have altered in shape, become swollen with little lumps forming on what are called "processes." In other cases, the nucleus of the diseased cells is pushed away from the centre towards the circumference, their "processes" shrink and disappear. According to Sir Victor Horsley, the value of whose investigations in this particular field it is difficult to over-estimate,

"A cell damaged in this way never recovers, and so far as we know is never replaced."

The disintegration and destruction of these very delicate and, from the intellectual and moral point of view, very valuable brain cells and their substitution by useless ones were what G. W. Crile, M.D., author of *Origin and Nature of the Emotions* had in mind when, on the page 113 of his book, he differentiated between three varieties of drugs in regard to their effects on the nerve-cells and nerve-fibres of the cerebrum. He said,

"According to their effect upon the brain-cells, drugs may be divided into three classes : first, those that stimulate the brain-cells to increased activity, as strychnin ; second, those that chemically destroy the brain-cells, as alcohol and iodoform , third, those that suspend the functions of the cells without damaging them, as nitrous oxide, ether..."

As regards the nerve-fibres, some of the finer and more delicate ones among them are destroyed. In

other cases, the sheaths have breaks in them leading to something like the leakage found in badly insulated electric wires. Both lead to defective functioning of the nerves.

In a word, where moderate doses of alcohol interfere with the function that is the correct working of the nervous system, the lesser evils which follow are perceivable through our experience. As against this, the microscope reveals, as in the case just mentioned, those injuries which become permanent after long use and excess.

Alcohol, the Spinal Cord and Medulla Oblongata

On page 136 of his *Alcohol and the Human Body*, Sir Victor Horsley has reproduced a slide showing a group of degenerated spinal nerve-cells from a case of neuritis and paralysis attributed to alcoholic excess in which the patient suffered from "marked sensory disturbances, local anaesthesia and pain." He draws attention to

"the shrinkage of the cells, the crumbling appearance of their edges, and the marginal position of the nucleus."

Describing the injury suffered through excessive indulgence, Sir Victor says,

"As the cells degenerate, shrink, and disappear, their place is taken, to a considerable extent, by the supporting connective tissue of the nervous system, which has no direct functional value and may be compared to the cotton wool in which jewels are packed."

Another authority, Dr. C. C. Weeks, tells us that "Some of the most intractable and distressing cases of disease

are due to the decay and degeneration of the nerve-cells of the spinal cord."

In extreme forms of injury to the spinal cord generally due to syphilis very often acquired under the influence of liquor and aggravated by persistence in its use, the cells in the grey matter and the fibres in the white matter composing it lose their power and although sensations pass from different parts of the body, they fail to reach the brain. Similarly, the orders of the brain for movement are blocked in the diseased cells and therefore no movement takes place and we say that the patient is paralysed.

As regards the medulla oblongata, we know first, that the functions upon which life depends are governed by it, secondly, that impulses from every part of the body are received and passed on to the brain through it and, lastly, that all the nerves which transmit messages from the brain to the muscles, etc., pass through it. From what has been said above, it is clear that alcohol can very easily interfere with all the three functions.

Alcohol and the Cerebellum

Competent medical men had long recognised the similarity between the reeling of such a cerebellar disease as locomotor ataxy and alcoholic poisoning. The explanation came only when the cerebellum's function of receiving impressions from the body and then passing them on from its grey cells to the cerebrum and, indirectly, to the spinal cord was

understood. We now know that our power of standing upright, of walking steadily and of balancing the whole body in different positions is conditioned by its unimpeded and healthy functioning.

A constant flow of evidence from all quarters has proved the absolute correctness of the following opinion expressed by Sir Victor Horsley and Dr. M. D. Sturge nearly four decades ago.

"When the cerebellum is affected by such a narcotic as alcohol, there soon occurs loss of the essential regulation of control of the limbs and especially of the lower limbs, which feel heavy and no longer move with precision. As a consequence of this, the ease of sitting still is preferred to the effort of even standing or walking, and when obliged to stand the person staggers slightly in assuming the erect posture, and later on reels if he attempts to walk forward."

No microscopic examination is required to prove that the normal functioning of the cerebellum depends on the perfectly healthy condition of the little masses of grey cells and white fibres, to which we have been referring so often, or that alcohol very seriously interferes with it.

Alcohol and the Cerebrum

Thinking, feeling and willing, in fact all functions of the cerebrum can proceed smoothly only when it is properly nourished by a liberal supply of healthy poison-free blood. It is also clear that to successfully discharge its task of governing or controlling the body, it should be kept free from everything calculated to exercise a depressing influence which

would, of course, interfere with its power of co-ordination and determination. Normally, its activity depends upon the sensitiveness of the millions of the most highly developed nerve-cells and nerve-fibres which make it up and it is quite obvious that the smallest dose of drugs is capable of affecting them thereby greatly reducing their vigour and vitality and, occasionally, even destroying them. This is exactly what alcohol does and that is why it is regarded as one of the worst enemies of man depriving him insidiously of all those God-given gifts which have placed him at the head of creation.

There is a popular saying that alcohol "goes to the head first." As a matter of fact, alcohol reaches the toes as soon as it reaches the brain. This is because the alcohol-laden blood goes all through the body and the brain, "directly exercising its influence upon the cells with which it comes into such close and intimate contact." What happens is that, in the language of Dr. Emil Bogen as used in his contribution to *California Western Medicine* for April, 1936,

"Alcohol apparently...reaches a slightly higher concentration in brain tissue than in the blood...It also appears to remain in the brain for a longer time than in the blood and other tissues."

Various theories have been advanced to explain the affinity of alcohol for the brain cells and brain nerve-fibres. Whether they are correct or not, there is no denying the fact that greater injury is suffered by the nerve-cells and nerve-fibres of the brain than by similar tissue found in other parts of the body.

Proof of this was supplied by Sir Victor Horsley who prepared slides from normal brain tissue taken from the "motor" area and from similar tissue taken from a case of alcoholic dementia. The latter, in his language, showed the following signs of degeneration.

- "(1) A diminution of the number of cells.
- "(2) Their disintegration as indicated by their imperfect staining and irregular outline.
- "(3) An increase of the tiny supporting (glia) cells, which take the place of the real nerve-cells, and are perhaps of no value as regards mental action."

The comment of this eminent authority on the above is as follows :—

"It is, of course, useless to expect mental integrity or ordinary sense to emanate from a brain in such a condition."

The chronic changes caused by alcohol in the nervous system of the drinker have been summarised in the following terms by Sir Victor Horsley :—

"In the first place there is a degeneration and ultimate destruction of the nerve-cells and their processes. In the second place there is an increase in the supporting tissue which replaces the nerve-cells, and which is entirely useless from the point of view of nerve action."

As regards the ultimate effects of the above mentioned chronic changes, this great specialist says,

"Here, again, we have impressed upon us the fact that alcohol tends to shorten life both by causing widespread degeneration and also by bringing on prematurely the special changes of old age. These changes in the case of the nervous system are, of course, especially to be dreaded because of the accompanying mental deterioration—a deterioration which makes life a misery, and which, from the first, renders it useless and ineffective."

CHAPTER VI

ALCOHOL AND THE NERVOUS SYSTEM (II)

After having made something like a survey of the damage suffered by the nervous system through drinking, we shall now turn to a consideration of some of those ailments directly traceable to it. Before doing so, it seems necessary to draw attention to the fact that as of all other organs of the body, the brain seems to possess what may be described as the strongest attraction for alcohol and, moreover, as it succumbs more easily to its ravages than other organs, we would naturally expect that mental disorders of various types would constitute a large proportion of diseases directly attributable to alcohol. This is exactly what is confirmed by experience. These comprise temporary mental instability as well as permanent mental deterioration with their varied manifestations.

Dipsomania

The insatiable passion for alcohol which, in most cases, results in physical and intellectual deterioration may be either periodic or chronic. In the former case, we have the disease known as dipsomania which has been described as "a condition of recurrent uncontrollable craving for alcohol."

Generally occurring at intervals from a month and a half to a year in individuals who, in the intervening

period, are quite immune to the temptation to drink, it is generally found among those who have indulged excessively in liquor early in adult life.

Once the intense hankering for liquor has appeared, the victim struggles to overcome it but always unsuccessfully after which he takes very large quantities of alcohol and continues to do so for a week or even a fortnight. This often culminates in an attack of delirium tremens.

Even when this does not happen, the dipsomaniac persists in his infatuation for liquor so that his brain is repeatedly soaked in alcohol. The surface layers of brain cells break down completely and cease functioning and he moves steadily to complete mental deterioration, becoming extremely dull and stupid. Ultimately, these people go to asylums for the feeble-minded.

Delerium Tremens

The patient suffering from this disease is known by "unceasing, often violent, activity which may lead to exhaustion." It is the trembling of every part of the body, the characteristic feature of this disease, which led Dr. Thomas Sutton to give it its name composed of two words the first of which means violent excitement and the second trembling. He also pointed out that it is found only in persons given to excessive drinking for a number of years. Later on, it was observed that it occurs less frequently among women than among men and, as the former are as

liable to it as males, the reason for the difference lies in the fact that fewer women are heavy drinkers than men.

From a comparative study of the prevalence of delirium tremens in different western countries, it has been inferred that it is

"highest where mainly high proof spirits are consumed with little dilution ; it is less frequent in wine-drinking countries ; and rather rare in beer drinking countries."

This is only a roundabout way of admitting the correctness of the view that long continued indulgence in excessive quantities of alcohol is the cause of this ailment.

It is widely known that sufferers from this disease see strange things whence delirium tremens is colloquially referred to as "seeing white mice" or "snakes." Actually, all kinds of animals such as dogs, horses, cats, birds, elephants, tigers, lions, etc., may be seen though the animal actually present may be a fly. These visual hallucinations, as they are called by physicians, may be suggested by the surroundings in which the patients live for, since the use of warm water in the treatment of this disease, some of them have been seeing fishes, lobsters, etc., in place of the above mentioned animals.

Sufferers from this disease may not only see imaginary animals but also hear imaginary voices and sounds known as auditory hallucinations though the latter are not half so frequent as the former. For instance, patients may say that they can hear murmurs,

ALCOHOL AND THE NERVOUS SYSTEM (II)

the noise made by running water, by the firing of guns and the ringing of bells. When voices are heard, they are usually connected with a vision. The visions and voices are almost always of a threatening nature and are indicative of the fear felt by them.

At other times, patients suffer from hallucinations in which they believe that they are under compulsion to finish tasks which can, under no circumstances, be completed. A typical instance is that of a waiter suffering from the hallucination of carrying millions of plates to the kitchen. These are called occupational hallucinations and result in constant efforts to carry out the tasks, the exertion undergone leading to fatigue and, finally, to severe exhaustion.

In addition, patients mistake objects and persons for something or someone else. They take the hospital in which they are undergoing treatment for a palace, a church or a school. They believe that they are in a new country, at some time in the past, recognising the physicians and nurses as old friends or assume that they are government officials, priests, soldiers, etc. This is known as dis-orientation for space, time and persons.

Ordinarily, an attack of delirium tremens does not last over a week, the first sign of recovery being that violent excitement gives way to deep sleep called the terminal sleep from which the patient awakens rested and with only some minor symptoms persisting. As regards the chances of getting rid of this disease permanently, the following extract from a brochure

prepared and issued by the *Quarterly Journal of Studies on Alcohol* should prove interesting :—

"Many of those who go through an attack of delirium tremens do not resume their heavy drinking for 2 or 3 months after their recovery, but then most of them, unfortunately, return to their former habits. And, as there is no immunity to delirium tremens, sooner or later they return to the hospital with a new attack. Occasionally the attacks of delirium tremens are the beginning of a mental disorder of long duration."

Alcoholism and Insanity

No intelligent man need be told that if any one insists on adding such a quantity of alcohol to his blood as is likely to result in morbid stimulation and irritation of his brain, he necessarily exposes himself to the danger either of actual insanity or of degenerative mental changes closely allied to it.

As a matter of fact, it is common knowledge that the drunkard as he plies himself with liquor till he becomes senseless undergoes all those psychological changes noticeable in the lunatic passing from normalcy to complete insanity. This was referred to by Dr. Henry Maudesley who, in his *Pathology of the Mind*, has drawn a parallel between the two in the following language :—

"A drunken man notably exhibits the abstract and brief chronicle of insanity, going through its successive phases in a short space of time. First, a brisk flow of ideas, inflamed emotions, excited talk and action, aggressive address, unusual self-confidence, a condition of stimulated energy with weakened self-control, so like the sort of mental excitement which goes before an outbreak of mania that the one is sometimes mistaken for

the other; next, as in insanity, sensory and motor troubles, incoherent ideas and conversation, and increasing passion, which, according to the previous temperament, is expansive, quarrelsome, melancholic, or maudlin, and which may sometimes as in insanity owning no cause, go through these stages in succession in the same individual; lastly, a state of stupidity or stupor, which might be called, and is essentially, a temporary dementia."

In proof of the close association between alcoholism and insanity, reference may be made to the very interesting statistical information contained in the contribution entitled "The Relation in Ireland between Lunacy and Drunkenness" which appeared in December, 1906, in the *Medical Temperance Review* and which has been used repeatedly by prohibitionists.

We are told that, during the period 1899-1903, the county of Waterford held the unenviable position of heading the whole of Ireland so far as the proportion of recorded cases of drunkenness and of lunacy to population is concerned. There was one drunken person in every 28·5, while the lunacy rate was one in every 104 of the population.

Attention may also be drawn to what Sir Thomas Clouston, M.D., etc., stated in the Report of the Morningside Asylum for 1903.

'Alcoholic insanity steadily goes up. This year no less than 42.3 per cent of all our men and 18 per cent of our women much the largest proportion we have ever had experience of—had excess in alcohol assigned as the cause of their insanity. In the five years 1873-7, the percentage of alcohol cases was only 18.5 among the men, and 10.4 among the women admissions. It has steadily gone up, and now it has doubled. No explanation will account

for this, but the one that certain classes of our population are, drinking to greater excess than they did, and in doing so are, many of them, destroying their sanity."

After having shown that alcoholic insanity is a close associate of heavy drinking, it will now be proved that the former diminishes as soon as the availability of alcohol is reduced. Here mention may be made of the opinion expressed by Dr. L. V. Guthrie, Superintendent of the State Hospital at Huntington, W. Virginia, U.S.A., who said,

"Since the prohibition laws have become effective in West Virginia, there has been a decrease of 75 per cent in the number of cases of alcoholic insanity coming under my observation."

Some Statistics

Taking the two great English speaking countries with which we are familiar and in both of which moderate indulgence in liquor is not yet widely regarded with disfavour, we find Dr. Joseph Wigglesworth in his evidence before the Inter-departmental Committee on Physical Deterioration estimating alcoholic damage in England and Wales at 29 per cent. Similarly, Dr. Rosanoff of Clark University, Massachusetts, U.S.A., estimated that 25 per cent of insanity in that country "is chargeable to the use of alcoholic liquors."

Turning to other western countries, we find that, according to the statistics of insanity in France, where indulgence in alcohol in the shape of wine produced in large quantities and sold at cheap prices, is common, as much as

"34 per cent of the cases of lunacy among males (who drink larger quantities than women) are due to intemperance."

As for Germany where both spirits and beer are extensively consumed, an eminent physician, Dr. B. Meyer in *Die Ursachen der Geisteskrankheit*, Jena, 1907, observed that

"20 to 30 per cent of all cases admitted to insane asylums in Prussia are produced by alcohol."

Dr. Cecil Webb-Johnson, after studying such insanity statistics of the world as are available, came to the conclusion that

"In the world's asylums (for idiots and the insane) the proportion of alcoholics to other patients is from 40 to 60 per cent."

It is to be remembered that, in calculating the above proportions, no account had been taken either of cases where the breakdown was more or less traceable to alcoholism in the parents of the patients, or of others where alcoholism was one of several factors causing insanity, the inclusion of which would, naturally enough, have resulted in higher percentages.

Alcoholic Melancholia

No list of nervous ailments due to alcohol would be complete without some reference to the mental depression caused by it. Those interested in the problem are aware how frequently some drinkers are in the habit of using it in quantities sufficient to depress their nervous system. Ordinarily, this is observed in the reaction and exhaustion making their appearance after devotion to alcoholic enjoyment.

These, however, generally disappear when the duties of normal life impose compulsory abstinence on the drinker who is thus afforded an opportunity of getting over them.

The type of alcoholic depression which, in its worst form, turns to melancholia and with which we are concerned here, generally results from the regular and heavy use of liquor making the above condition a permanent one especially where the individual concerned is in a condition of what is known as "unstable equilibrium" associated with such factors as over-work and the presence of poisons like syphilis in the blood. And it is no wonder if, under such circumstances, the consumption of liquor should tend to reinforce any latent tendency towards melancholia, natural to an already exhausted brain or that it should even precipitate an attack. It was while explaining the nature and the cause of this distressing malady that an acknowledged authority stated,

"Undoubtedly in alcoholic depression we see exhibited to the full its power to cause prolonged poverty of action of the nervous system, in consequence of which all thoughts are sad, and all actions seem to require a great effort before they can be accomplished."

It is understood that the sufferings incidental to bodily diseases bear no comparison with the inexpressible feelings of utter helplessness and misery experienced by victims to alcoholic melancholia. It has also been held that as such patients are fully conscious of their sufferings, they therefore feel more

wretched than victims to other varieties of mental disease.

Alcohol and Suicide

As a depressant, the influence of alcohol on the brain is seen when, with the end of the very brief excitant effect on the nervous system, there appears the prolonged state of despondency and gloom so intolerable to many alcoholics and partly to avoid which they go on plying themselves with liquor till total insensibility sets in. The steady impoverishment of the body which makes the drinker incapable of exerting whatever energies he has, together with the depression of which he is the victim, are responsible for many cases of suicide.

According to one school of thought, the depression, the major factor in causing suicides, is due to two reasons, the direct action of the alcohol upon the cells of the brain and its power of interfering with metabolism, a matter referred to elsewhere, the result of which is the retention of body wastes which also depresses the nervous system as a whole.

Proof that alcoholism is responsible for many cases of suicide is available from many sources, reference to only two of which can be made here.

Dr. W. C. Sullivan, M.D., Medical Officer in the Prison Service of the United Kingdom, drew attention to the connection between increase of suicides or suicidal attempts and alcoholism stating on page 55. of his book *Alcoholism* that

"In 220 consecutive observations of such attempts, the proportion due to alcoholism was found to be 78 per cent, the usual condition present in four-fifths of the cases being drunkenness supervening on chronic intoxication."

It was also pointed out that mortality from suicide among keepers of public houses, etc., is more than twice the average, from which it is inferred that this is due to the ease with which they can drink thus bringing on mental depression, the cause of their self-destruction.

According to the United States Mortality Reports, twenty-three per cent of the suicides in the United States are ascribed to intemperance. It has been estimated by N. F. Richardson (*The Liquor Problem*, p. 20) that, during the years 1900-1908, no less than 11,986 individuals committed suicide in the U.S.A., "because of alcohol."

What is implied by the verdict invariably given in such cases, "whilst temporarily insane," is that the brain under the influence of alcohol temporarily loses its balance and its capacity for control with the result that the outlook on life becomes hopelessly emotional and morbid so that even self-inflicted death is welcomed as a relief from the miseries of existence.

Alcohol and Feeble-Mindedness

Occasionally, excessive drinking while not actually producing melancholia of the type which requires confinement in asylums, is responsible for equally

far-reaching mischief. The body, weakened by the constant presence of alcohol, has its effect on the mind, the brightness of which depends on the health of the brain. Heavy drinkers gradually lose their mental alertness, their movements become slow and sluggish and their faces dull and lifeless. The next step is the gradual advance of idiocy between which and drinking there is very close connection as was shown by the investigations of Dr. G. Alfred Mjoen referred to elsewhere who, while referring to the effects of excessive drinking of distilled liquor and its subsequent reduction in Norway between the period 1816 to 1848, said,

"The enormous increase of the feeble-minded came and went with the brandy."

This was corroborated by Dr. S. G. Howe who, basing his finding on statistical materials secured from the State of Massachusetts, U.S.A., ascribed "one-half of the cases of idiocy" in it to intemperance.

Alcohol and Epilepsy

Brain excitation when produced by drugs leads to certain ailments only one of which, by far the commonest, will be dealt with now. This is epilepsy, characterised by convulsive seizures. It is produced by alcohol quite easily in persons who possess, congenitally, an unstable brain.

This is not surprising in view of the large number of persons born into this world with more or less brain deficiency in whose case the irritant action of

alcohol operates as the last factor in interfering with the control of what we call the motor centres thereby bringing on abnormal and uncontrolled muscular movements accompanied by loss of consciousness.

This was referred to by Dr. F. W. Mott, M.D., F.R.S., who, in his *Alcohol and Insanity*, has said,

"Alcohol, even in comparatively small quantities, may convert the potential lunatic into a raving maniac, and it is specially dangerous to the epileptic and feeble-minded, leading in the former to the production of motor and mental fits, and making him irresponsible and anti-social and sometimes very dangerous to himself and others."

Dr. Matthew Woods was more definite when, referring to the United States, he said,

"Drunkenness and its consequent degeneracy explains 35 per cent of epilepsy."

Nothing is said here about this disease as found among children of drinking parents, a matter dealt with elsewhere.

Other Alcoholic Mental Diseases

In addition to mental depression and melancholia, etc., there are other mental diseases to which some reference may be made now. The first of these known as Korsakoff's disease is a serious one caused almost invariably by the use of strong liquors like whisky and brandy. It is characterised by very severe pains in the arms and legs due, it is held, to degeneration of nerves caused by alcohol. The mental symptoms are forgetfulness in regard to what has been said or

done. The patient is unable to recall what had happened the previous day ; he imagines queer things and makes up stories about events he supposes had taken place. It is understood that it is not generally curable.

Next, we have the disease known as paramnesia that is failure of memory of recent events due, it is presumed, to alcoholic poisoning of the brain. Its most prominent symptoms are forgetfulness of recent occurrences and their replacement by imaginary or long past events. The patient's failure of memory results in utter neglect in carrying out promises and duties ; consciousness of time and space is lost and there is lack of ability to distinguish between past and present. There is such confusion in the brain that it is perfectly useless to expect any accuracy in such statements as may be made by a victim to this disease.

In alcoholic hallucinosis, the sufferer imagines that he hears voices calling him by name, that people are watching him from hiding places and that they plan to hurt him. The first sign of improvement is seen when he becomes quieter and ceases to notice the imaginary voices though he still labours under the impression that he hears them. Only a small percentage of such people are cured by medical treatment.

Lastly, we have a more serious mental disease, alcoholic paranoia, in which the patient becomes suspicious of every one around him including his best

friends and closest relatives. He is jealous of his wife and children and, at times, becomes violent and even dangerous.

Alcoholic Insomnia

Alcoholic insomnia is that type of sleeplessness which results from intemperance and which disappears with abstinence from liquor because, with it, the irritation of the brain due to the circulation of alcohol-laden blood comes to an end. It is generally found in those people who, to ensure sound sleep, start by taking a drink shortly before going to bed and, at first, achieve the desired object by reason of its narcotic effect. Later on, such a man awakes early in the morning when the effects of alcohol have disappeared and this tendency increases steadily so that the hours of rest gradually get smaller and smaller. It is then that he is compelled to take another drink to ensure a further instalment of rest. Finally, he has to go to bed with a bottle of liquor beside him so that he might take alcohol every few hours all through the night. Such a patient, competent medical men hold, "is in imminent danger of delirium tremens." Even where this does not happen, he runs another very serious risk pointed out by Dr. A. L. Smith, M.A., M.D., M.R.C.S., etc., who says,

"The quantity necessary to anæsthetize has to be constantly increased until the quantity in the blood at one time is so great that every organ in the body is injured. Many thousand cases every year have died from alcoholic injury to the liver and brain

and heart and kidneys which had its beginning with a supposedly harmless drink or two at night which had to be repeated four hours later when the stupefying effect had passed off, and the still excited heart was continuing to pump an unnecessary supply of blood into the paralysed blood-vessels."

Alcoholic Neuritis and Paralysis

After dealing with the more important ailments of the brain due directly to alcohol, we shall now pass on to consider those resulting from the degeneration of the nerves distributed in the body, the most painful of which is neuritis. This is a neuralgic disease of the nerves of the body accompanied by loss of power in the limbs often mistakenly regarded as rheumatic in origin especially where the legs are affected. Competent medical authorities hold that the pain is due to an inflamed state of the sheaths of the nerves. The inflammation begins to subside only after the use of alcohol is given up.

It often happens that friends and relatives of the patient who have seen him taking alcohol regularly and apparently without any injury for years, are unable to account for the disease and even the attending physician fails to suspect the cause until the pains have existed for some time and the loss of power has become marked.

Cure of this obstinate ailment not merely means abstinence for a few days or weeks but for months to enable the body to get rid of the poisons accumulated in it. This, along with suitable treatment, is necessary

so that the damaged structures may have a chance of being again rendered fit for service.

The same condition in its intenser form especially where the legs, the feet and sometimes the hands are affected, goes by the name of alcoholic paralysis. The causes and the treatment are, naturally enough, the same.

CHAPTER VII

ALCOHOL AND THE BLOOD

The investigations of Louis Pasteur and his successors show that some diseases are carried to the body by what are called micro-organisms also known as bacteria or germs. These living things, only some of which are harmful to the body, are so small that they can be seen only with the help of the microscope. These men also found that every disease has its own special micro-organism and seeing that we are, as it were, besieged by them on all sides, it is a matter of astonishment that we are not a constant prey to various ailments.

The reason for our freedom from the maladies caused directly by micro-organisms is that the normal healthy body has the power to protect itself against their attack. The most powerful defences of the body against illness are found in the blood which, penetrating to every nook and corner, destroys in the manner described below those micro-organisms which cause it.

The blood consists of a clear liquid called the plasma in which are the red corpuscles (which owe their colour to a colouring matter called haemoglobin, their chief ingredient), the white corpuscles and what is known as the blood complement. The corpuscles, red and white, are minute living bodies so infinitesimally small that, according to the latest

estimate, five million of them would occupy only as much space as a grain of sugar.

The fluid part, the corpuscles, red and white, as well as the blood complement have very important tasks to perform so that the body may be kept healthy.

Blood Plasma

The fluid part or plasma of the blood consists of water, albuminous substances and various kinds of salts including phosphates and chlorides of calcium and potassium. Small quantities of sugar and urea are also present in it. The former is there as food absorbed from the intestines while the latter is one of the waste products eliminated by the cells being carried by the blood to the kidneys, through which it is dismissed from the body.

An important service performed by blood plasma is to carry off that part of the poisonous carbon dioxide gas which is not got rid of by the red corpuscles. It has also been held that there is capacity in the fluid part of the blood "tending to kill the germs."

Alcohol and the Blood Plasma

This liquid portion of the living blood, according to Sir Victor Horsley (*Alcohol and the Human Body*, p. 206), possesses "very definite powers in assisting to defend the body against invasion by disease and microbes." He holds that when disease producing

micro-organisms are absorbed into the circulation through the lungs or bowels, the healthy blood plasma counteracts their injurious effects and ultimately destroys them.

This view is based on the elaborate and prolonged researches carried out by Dr. Laitenen who employed the microbe causing typhoid fever in the case of large numbers of persons with a view to obtaining reliable averages. The finding was as follows :—

"When small amounts of human blood were brought in contact with these microbes, and the resisting and conquering power of each specimen of blood estimated separately, the blood from those human beings who were abstainers possessed a greater power of resisting the growth and development of the bacteria (than the blood of moderate drinkers)."

From the above, it follows that if the fluid constituents of the human blood in the case of moderate drinkers possess lessened potency as regards destroying bacteria than those of total abstainers, it is only because of their lower resistive power due to the use of liquor.

Functions of Red Blood Corpuscles

Red blood corpuscles are very tiny flat bodies like coins hollowed on both sides being only $1/3,200$ th of an inch in diameter. Looked at singly, they are yellowish but in masses appear red in colour. As stated previously, these contain as their chief ingredient a colouring matter called haemoglobin. The colour of the blood is due to their presence in it in

very large numbers for, as a rule, there are about four hundred and fifty red to one white blood corpuscle. The red corpuscles are constantly destroyed in the liver and spleen and are replaced by new ones coming from the red marrow of the bones. The albuminous constituents of the red corpuscles play a valuable part in the establishment of immunity to disease and also of the conditions under which they preserve their colouring matter.

The colouring matter in the red corpuscles appropriates the oxygen of the atmosphere when the blood comes into contact with the air in the lungs. This substance possesses the somewhat peculiar power of holding the oxygen, so essential to health and life, so to say, lightly, with the result that when the red corpuscles reach the cells which require it, they readily and easily give it up. Not only that, the cells form carbon dioxide gas which has to be got rid of. So wonderful are the devices of Nature for the preservation of health and the maintenance of life, that this poisonous gas has what may be called a greater attraction for the colouring matter than for oxygen. It therefore turns the oxygen out and takes its place.

Alcohol and Red Blood Corpuscles

According to the German investigator Albrecht as quoted by Sir Victor Horsley on page 205 of his *Alcohol and the Human Body*, the action of alcohol like that of ether and chloroform is

"probably to change the constituents of the (red) corpuscles which are of a fatty nature, and to damage the underlying structure of the cell."

As regards the effects of continuous indulgence in liquor even in moderate quantities, Sir Victor observes,

"The repetition of this damage leads ultimately to more or less anaemia, which is recognised as a frequent accompaniment of alcohol-taking, and especially of alcoholic cirrhosis of the liver."

As the result of a series of researches extending over a number of years, Prof. Laitinen of Finland came to the conclusion that, while a small dose of alcohol does not reduce the number of red corpuscles, it "notably affects their resisting power when attacked by agents which tend to dissolve and break them up," in which connection it has to be remembered that this process known as haemolysis of the red corpuscles means "a very serious diminution of power to resist infective disease." That the mischief does not end here is proved by what appears below.

Dr. Harley's Experiments

Dr. George Harley, a distinguished English physician, conducted a series of very interesting experiments to determine whether alcohol helps or hinders the work of the red blood corpuscles. He mixed fresh blood with varying amounts of alcohol and then tried to find out whether its absorbing or giving off power was impaired or increased as compared with a portion of fresh blood of the same animal to which

no alcohol had been added. In his report submitted to the Royal Society of Physicians and Surgeons, he stated the following in regard to the oxygen-absorbing power of fresh blood and of blood containing alcohol,

"When ordinary air containing 20 per cent of oxygen was mixed with pure blood and shaken with it, 10 per cent of the oxygen disappeared, but with 5 per cent of alcohol added only 4 per cent of oxygen disappeared."

As regards the power of taking and then carrying off carbon dioxide under the same conditions, he found that

"In pure blood there was 3.3 per cent of carbon dioxide formed ; with blood plus 5 per cent of alcohol added, there was 2.3 per cent of carbon dioxide formed. The alcohol changed the blood's colour to a pale brick, and when added in the proportion of 10 per cent, it entirely lost its power of becoming oxidized."

These valuable investigations prove that alcohol-laden blood can neither supply adequate quantities of oxygen to the tissues or take away from them as much of the poisonous carbon dioxide gas as is possible in the case of the total abstainer.

The service done by the blood through the agency of the red corpuscles is something like that of a double transportation system. It reaches oxygen where it is needed and collects and takes away carbon dioxide wherever it is produced in the body. Alcohol by slowing up the delivery of oxygen and helping the deficient collection of carbon dioxide encourages the accumulation of uneliminated waste material in the tissues.

This explains why most of those addicted to liquor

tend to put on weight, a great hindrance to muscular performance and a downright invitation to ill-health.

Functions of White Blood Corpuscles

The white corpuscles which are much fewer in number than the red ones are, on the average, only 1/2,500th of an inch in diameter and, while varying in size and appearance, contain nuclei and, as such, are true cells. In structure, they resemble the amoeba, and, like it, they are capable of altering their shape and of moving from place to place.

The illustrious scientist, Professor Metchnikoff of the Pasteur Institute, was the first to announce to the world his discovery that the white corpuscles possess the power of destroying the micro-organisms which cause so many diseases. They have therefore been compared to the standing army or policemen of the body whose duty it is to attack and, at all costs, to destroy any foreign matter such as dust, or disease germs which may gain an entrance into our system.

The white corpuscles carried in the blood move not only along the stream but also from side to side. Whenever their services are needed, they stick for a moment to the very thin wall of the capillary and then, pushing out something like feelers, gradually force their whole bodies through it and pass into the tissues where they attack the invading germs by throwing out and enclosing them in the little fingers called processes and afterwards destroy them. Their method of surrounding or swallowing disease

germs and waste matter has led scientists to call them phagocytes or devouring cells.

The battle carried on by the white corpuscles against the invisible and yet highly dangerous enemies of health and life has been described in the following language by Sir Victor Horsley C.B., F.R.S., F.R.C.S., etc., Professor of Pathology, University College, London :—

"If microbes or chemical irritants are present in one particular part of the body, these white blood-cells leave the blood-vessels in the neighbourhood in large numbers and stream towards the point affected. They then attack the germs and seek to destroy them. In so doing they are, many of them, in their turn destroyed, and their dead bodies, along with the fluids of the inflamed tissues, form 'matter' or pus "

When a man suffers from an attack of a dangerous sickness like pneumonia or enteric, the fight between the white corpuscles and the germs of the disease is necessarily a long drawn-out one and much execution is done on both sides. The fresh supplies of phagocytes required for carrying on the struggle are drawn from the bone-marrow where they are manufactured. At a crisis like the one mentioned above, it produces them in such large amounts that three to four times the normal number are frequently to be found in the blood.

Alcohol and White Blood Corpuscles

Two Belgian observers, Massert and Bordet, found that, even in small doses, alcohol repels the white cells very strongly. Consequently, if alcohol in even

minute quantities is circulating in the blood, the white corpuscles find it difficult to collect at the point of attack or carry themselves quickly to the place where their services are needed. It has also been proved that alcohol in extremely small doses paralyses them more or less so that they cannot properly exercise their functions as destroyers of microbes. In other words, rendered less alert through the influence of alcohol, the white cells remain passive and motionless in the presence of dangerous micro-organisms which it is their duty to destroy and that promptly.

This neglect of duty on the part of the white corpuscles, for which they are certainly not to blame, leads to severe illness where unusual delay in dealing with germs gives them an opportunity of establishing themselves so strongly that they cannot be driven out easily. This is particularly true of the microbe responsible for erysipelas and cellulitis. It was also found in the Pasteur Institute, Paris, that failure to check the development of hydrophobia in persons sent to this world-famous institution, occurred in almost every case among alcoholic patients.

Under these circumstances, very few intelligent and impartial men will be found to dispute the correctness of the view that

"The seriousness of this adverse influence of alcohol upon the vigour and energy of the white blood-corpuscles cannot be overestimated. Herein lies the explanation of many infections, many prolonged illnesses, much chronic ill-health, and many premature deaths."

Functions of the Blood Complement

In addition to the red and white corpuscles, other substances, one of which is known as the blood complement, are also found in healthy blood plasma. It has been established that their presence in it is required to assist the phagocytes in removing the disease germs from the body. Known as opsonins, they are produced in increasing amounts by the body whenever it is invaded by disease microbes. The name given comes from a Greek word which means "to give an appetite, or to provide victuals, or prepare the feast, or to cater for." And it has been given to these substances because this is exactly what they do.

Carefully conducted experiments under controlled conditions have, in the language of a standard work on the effects of alcohol on the system of man (*The Scientific Authority for Total Abstinence* by C. C. Weeks, M.R.C.S., L.R.C.P., etc.), shown that the opsonins in our blood

"(i) increase the activity or appetite of the phagocytes ;

"(ii) they make the germs more acceptable to the phagocytes, and thus they cater for the phagocytes and prepare the feast."

In the course of these investigations, it was also found that the disease germs within certain well-defined limits fight against themselves because they possess the power of encouraging the production of

what are known as anti-toxins that is substances tending to prevent further infection.

Two important consequences followed from this new knowledge. The first was the adoption of the system of immunisation to certain germ diseases through the process of vaccination or inoculation. Under it, if an animal or a human being is vaccinated or inoculated with a small dose of germs, these substances are produced in such amounts that even a subsequently large dose of the same germs will do no harm. It is thus that many a precious life has been saved from attacks of typhoid, cholera, etc.

Further, even where a person in whom immunity had not been previously established through the above means is attacked by a germ disease, it has become possible to fight the microbes causing it by the use of injections. The system of the treatment of tetanus or lockjaw, diphtheria, typhoid fever, to mention some only of the many diseases which nearly always ended fatally in the past, is based on our knowledge of the above-mentioned intricate and interesting process.

Alcohol and the Blood Complement

Many years ago, the attention of medical men was drawn to the fact that impaired nutrition, the first symptom of the habitual consumption of liquor, is almost invariably followed by an interference with the production of immunity. The explanation of this was found after a series of tests on lower animals conducted by two investigators, the results

of which were summarised by Professor G. Sims Woodhead, M.A., M.D., Professor of Pathology, University of Cambridge, England. According to him, these research workers found that, under the influence of alcohol, the blood complement is distinctly, though irregularly, reduced. From the fact that the resulting insufficient blood complement is not ample enough to combine with the necessary nutrient protein or albuminoid substances contained in the blood, they argued that the impaired nutrition met with in the alcoholised animals experimented upon and therefore of men addicted to drinking, is due to the reduction of these substances. They also proved that the fighting of disease germs by the white corpuscles which only can destroy them cannot establish immunity, possible only when the blood contains them in adequate quantities, something quite in the hopeless case of the habitual user of alcoholic beverages.

Later on, Dr. C. E. Stewart conducted a series of tests to determine the effect of alcohol on what is technically called the "opsonic index" or the measure of the bodily resistance to disease. According to the report submitted by him, he found

"the index number indicating normal resistance to the bacillus tuberculosis to be 1.17 and for streptococci 1.12. The average of these same cases after the administration of two ounces of port wine was .73 and .655 respectively, showing a drop in the opsonic power of 37 per cent in the former and 42 per cent in the latter case."

These experiments conducted on healthy men under control prove beyond any doubt the reduction

in the defensive power of opsonins through the presence of alcohol in the blood.

Dr. Delearde's Investigations

Many experiments have been made on both human beings and animals to prove that the body's power to resist disease is reduced by drinking, to only one of which reference can be made here.

Dr. Delearde's attention was drawn to this matter by noticing the case of two patients, a man of thirty with a tendency towards intemperance and a child of thirteen, bitten on the same day by the same mad dog to both of whom careful anti-rabic treatment was given. The former who had been bitten on the hand died while the latter made a quick recovery though bitten on the head and face regarded as the most dangerous places where a patient can be bitten. The only factor which differentiated the two cases was that the man was in the habit of drinking while the child, naturally enough, was a total abstainer.

Not quite satisfied with the above explanation of the death of his patient till he had secured further evidence to confirm his views, Dr. Delearde commenced prolonged researches as regards the effects of alcohol on rabies in animals using rabbits for his experiments. He found that he was quite successful in establishing immunity against this disease by vaccinating them against hydrophobia. Using other sets of the same animals, he next proceeded

"to test the effect of alcohol administered to the rabbits in

doses varying from $1\frac{1}{2}$ to $2\frac{1}{2}$ teaspoonfuls daily, in helping or hindering the acquisition of immunity during the whole period of vaccination against rabies."

The results secured amply corroborated the conclusions he had drawn from his observations on his patient who had died. The rabbits which had been given alcohol remained just as susceptible to rabies as if no attempt had been made to give them immunity through vaccination.

Still another series of experiments established the fact that when alcohol was given to the rabbits before the period of vaccination but was totally stopped during and immediately after the days of injection, a certain degree of protection against hydrophobia was established by the anti-rabic treatment but it was neither so great nor so satisfactory as when no alcohol had been given throughout the experiment.

The results arrived at by this eminent French investigator created a profound sensation in the medical world when they were published in the eleventh volume of the *Annales de l'Institute Pasteur* in 1897. These received further confirmation from the investigations conducted by Professor C. F. Hodge of the Clark University, U. S. A., nothing about which can be said here on account of lack of space.

The whole matter, however, can be summed up in the words of Professor Welch, the distinguished American pathologist who, in his *Physiological Aspect of the Liquor Problem*, observed,

"The lowered resistance (due to alcohol) is manifested both

by increased liability to contract disease and by the greater severity of the disease (contracted)."

All the information in regard to the injury sustained by the blood through the use of alcohol may now be summarised in the language of a medical man who has dealt with it in a non-technical and interesting way. He says,

"Patients vary in their power of resistance ; some 'take' every disease which is about, others seem to be able to resist. Those who fall an easy prey to disease do so because their phagocytes are deficient in power, or their opsonins are less active, or because their general power of resistance is weakened. The practical point is that when we take a large number of persons, we find that alcohol clearly and definitely has an adverse influence on every one of the factors which enters into the successful fight against infections and blood-poisoning. Amongst other reasons this is why all surgeons dread operating upon alcoholic subjects."

CHAPTER VIII

ALCOHOL, AN ALLY OF DISEASE

Today all medical men are agreed that, directly and indirectly, alcohol is responsible for a large proportion of the diseases afflicting humanity. This accounts for the comprehensive statement issued by Dr. Emil Bogen, a specialist in the symptoms, causes and nature of disease, in the course of which he said,

"No other poison causes so many deaths, or leads to or intensifies so many diseases, both physical and mental, as does alcohol in the various forms in which it is taken."

This is because alcohol affects every part of the body which it reaches through the blood. Its power for evil is exercised in the following ways.

Baneful Influence of Alcohol

The oxygen contained in the blood meets various kinds of oxidizable material in the body such as food-stuffs, waste material resulting from tissue growth and repair, foreign matter and poisons. One of the functions of the blood is not merely to oxidize food-stuffs thereby liberating heat and energy but also to at least partially burn up, prior to removal, the other materials. This combustion of waste materials has, more than once, been very happily compared to the destruction of rubbish on a fire where the thoroughness of the work depends on the full and free supply

of air laden with oxygen to the heap of burning substances. It is thus that harmful foreign matter including poisons such as iodine, strychnine, etc., are broken up and deprived of their injurious properties.

Dr. J. R. Lees, the great English temperance pioneer, was the first to prove that alcohol has the power "of interfering with and lessening oxidation" because it "robs the tissues of the oxygen which they would otherwise use for combustion." The result of the delay in the normal rate of tissue combustion is that they cannot adequately get rid of their waste material so that many effete substances which ought to be eliminated promptly are retained in the body. As a consequence, ill health or diseases of various kinds almost invariably afflict the drinker.

Further, alcohol invites sickness by reducing the capacity of the body to resist invasion by the causes of disease, especially microbes. This was emphasised by Dr. R. B. Wild, Professor of Materia Medica in Manchester University, who said,

"Alcoholic subjects with degenerated tissues, are well-known to fall easy victims of infectious diseases, and there is considerable evidence that even in non-alcoholic subjects a dose of alcohol will lower the resisting power to infection."

It need hardly be added that liability to infectious diseases due to general impairment of health caused by faulty metabolism is enhanced in the case of poor people who, on account of waste of their means, cannot afford either good housing or adequate amounts

of nourishing food. This explains the high mortality rate among them from maladies of this particular type.

As some account of the ailments due directly to the damage inflicted on our vital organs by alcohol has been given already, it is proposed to deal here with some of the diseases promoted by its use and also to show how addiction to liquor has the effect of either hindering quick recovery or in baffling attempts to cure them.

Diseases of Defective Metabolism

It must be obvious that an agent which interferes so greatly with oxidation in the tissues and obstructs the elimination of body wastes leading to faulty metabolism, must necessarily be a prolific source of those diseases which are caused by its injurious effects upon the normal chemical processes of the body. Today, almost every educated man is aware that diseases like diabetes and albuminuria as also gouty conditions have, as their ultimate cause, progressive and degenerative tissue deterioration resulting from a change in metabolism often, but not always, due to alcohol.

Taking the first two diseases mentioned above, we find that, simultaneously with hampering by alcohol of the normal functioning of the liver and pancreas, there frequently occurs the excretion of sugar in the urine. Similarly, the damage inflicted

on the kidneys by alcohol causes loss of albumen through the urine.

As regards the third, the different symptoms which taken together constitute the condition known as "gouty" are, as almost every one knows, more frequently than not, largely due to alcoholic beverages used by the sufferer or his ancestors,

"the disorder of metabolism set up being transmitted through possibly several generations."

We shall now proceed to deal with some of the ailments which attack man mainly by reason of a diminution of vital resistance. This, as shown previously, is nearly always to be found in the drinker whose tissues suffer degenerative changes and whose alcohol-laden blood loses much of its power to resist the invasion of microbes.

Drinking and Dysentery

Dysentery is one of the diseases prevalent in tropical countries owing to the ubiquity of the microbe which causes it and the multiplication of which is greatly encouraged by the lowered resistance of the intestines caused by unsuitable food and by alcohol.

Probably the most widely known instance of the harm done by alcohol in the spread of this disease is the experience of General McClellan's army on the banks of the Potomac River in the course of the American Civil War when, after many weeks of great hardships in fighting and of exposure to wet,

the army authorities issued a spirit ration in the form of whisky to the soldiers under the belief that it would put an end to the diarrhoea and dysentery which had grown very common among them. Within one month, it had to be withdrawn because it was found that drunkenness, diarrhoea and dysentery had increased to an alarming extent.

The medical officers of the fourth corps who had been ordered to submit a report on the sickness in the camps, stated unanimously that "the use of whisky ration was injurious." This view was corroborated by the Principal Medical Officer of General Smith's Division who, in his report, said that not only had whisky "increased bowel affections," but also that "it was nothing but an unmitigated source of evil."

Drinking and Cholera

The resistance of the mucous membrane of the alimentary canal to cholera and, it may be added, dysentery, germs is greatly reduced by the drinking of alcohol which, as stated previously, causes an extra secretion of mucous. This is so well-known that today no qualified medical man would venture to assert that alcohol does anything except render the user of it just so much weaker and, therefore, more liable to contract cholera if exposed to the infection.

This doubtless explains why in the cholera epidemic in Glasgow in 1848-1849, 19·2 per cent among total abstainers and 91·2 per cent among those

habitually addicted to alcohol died out of the 225 cases which came under the observation of Dr. Adams.

Another medical man has stated that cholera killed off every drunkard in the city of Tiflis which, at the time, had a population of 20,000 souls. Dr. Duncan, on page 265 of his *Prevention of Disease in Tropical Campaigns* has said,

"No rum ration should on any account be allowed. Cholera ever attacks the intemperate first, and cholera prefers alcohol drinkers."

It goes without saying that, as the learned author was dealing with the problem of the health preservation of European troops campaigning in tropical countries, the advice he gave was meant for them. At the same time, it is clear that it is equally applicable to all.

Alcohol and Influenza

Formerly, it was a belief common among many people in the West that alcohol, generally in the form of whisky in hot water to which fresh lemon juice has been added, is both a preventive and a remedy for influenza. Brandy was also supposed to possess the same virtue, though in a lesser degree, and was used when whisky was unavailable.

During and immediately after the First Great War, the British Government compulsorily reduced the quantities of beer and spirits manufactured in the United Kingdom so that larger amounts of the cereals used in their production might be available for feeding

people. When the great epidemic of influenza which caused such immense loss of life appeared after the end of the war, many people, especially those financially interested in the whisky trade, asked Government to permit the manufacture and sale of larger amounts of this liquor on the plea of its utility as both a preventive and a cure of this disease.

Nine distinguished English medical practitioners, *viz.*, E. M. Brockbank, M.D., F.R.C.P., Catherine Chisholm, M.D., J. Gray Clegg, M.D., F.R.C.S., Sir W. Milligan, M.D., Alfred A. Mumford, M.D., Albert Ramsbottom, M.D., F.R.C.P., Ernest S. Reynolds, M.D., F.R.C.P., A. T. Wilkinson, M.D., and Alexander Wilson, F.R.C.S., sent a statement to the press. This received very wide publicity on account of the eminent position the signatories held in the profession. The following lines are taken from their statement :—

"We desire to state that in our opinion the value of whisky and brandy in the treatment and prevention of influenza is greatly over-estimated...Alcohol, after producing a temporary feeling of well-being, is generally followed by...a condition which renders the body more susceptible to attacks by germs, or if attacked, less able to resist the effects. Alcohol is in no way a preventive, and, further, in the general treatment of influenza, alcohol is unnecessary."

From the point of view of the present discussion, the most important sentence in the statement is that alcohol "renders the body more susceptible to attacks by germs," from which it is inferable that the habitual user of liquor is more liable to be attacked by influenza and less able to resist its ravages than the total

abstainer in which connection, we might recall the opinion of Dr. A. D. Bevan, M.D., of the Rush Medical College, U.S.A., who said,

"Alcoholic drink neither promotes greater healthfulness nor in any way retards disease. Alcohol does not assist the body in resisting infections like those of pneumonia and influenza."

Alcohol and the Lungs

Before proceeding to deal with the two lung-diseases, referred to below which are responsible for large numbers of deaths, we ought to know something about the way in which alcohol, by lowering the resistive powers of the lungs, exposes people to attacks of pneumonia and tuberculosis.

In this connection, the first thing we have to remember is that habitual users of alcoholic beverages are more liable than others to irritation of the mucous membrane of the throat which gets baths of alcohol at frequent intervals. This, in itself, is not very risky as Nature tries to protect it as well as other parts of the body such as the stomach, etc., exposed to direct contact with alcohol, by the supply of liquid matter provided by the body.

The real danger from the catarrhal condition comes when, owing to the use of alcohol, it appears in the large tubes of the lungs. It is then that their healthy condition disappears and the patient becomes more liable than the abstainer to bronchitis and to infection by the germs of pneumonia and tuberculosis.

A second danger to which habitual users of liquor

are exposed has been described in the following way by Sir Victor Horsley on page 281 of his *Alcohol and the Human Body* :—

"The repeated taking of alcohol leads to a dilatation of the blood-vessels of the lung, and a tendency to congestion is set up. Lungs in this condition of incipient congestion are readily affected by climatic falls of temperature, and by the invasion of microbes, and the outlook when such lungs become actively diseased is proportionately serious."

Drinking and Pneumonia

The fact that the habitual use of alcohol predisposes to pneumonia was emphasised, probably for the first time, in July, 1900, by the Medical Superintendent of the famous Mill Road Infirmary, Liverpool, in a paper contributed by him to the *Liverpool Medical and Chirurgical Journal*. In it, after relating his experience in the treatment of 1,047 cases of pneumonia with 246 deaths, he had the following thing to say about the connection between the two :—

"Alcoholism is the most potent predisposing factor, and I have now come to look upon the previous alcoholic condition of a patient as the arbiter of his life when attacked by pneumonia."

Dr. A. A. Hill in the course of a contribution entitled "On the Use of Alcohol in Pneumonia" which appeared in the *British Medical Journal* early in February, 1909, said,

" 'Lobular pneumonia, cardiac failure'—so runs the usual (death) certificate ; and the cause of the cardiac failure in ninety-nine cases out of a hundred is alcohol."

In 1911, came the report of the Registrar General

for England and Wales drawing attention to the excessive mortality from this disease of males over females much of which he ascribed to alcohol "though," he observed, "the fact does not appear in the death certificate." The figures supplied by him showed that the death-rate of males from lobar pneumonia as distinguished from broncho-pneumonia, a very common cause of death among infants and aged people, rises after puberty reaching its maximum at forty-five when "it is nearly $2\frac{1}{2}$ times that of females" The death of men in the prime of their life when they are of most value to their country and their families, he put down to the habitual use of liquor which, commencing after puberty, reaches its greatest intensity by about the above mentioned age.

It was also pointed out that, in addition to liquor making the drinker more susceptible to pneumonia, there are such factors as "poor food, carelessness in observing the rules of health, exposure to wet and chilling" which often occur when men are under the influence of alcohol.

The close connection between the chances of a cure and the quantity of liquor habitually consumed was brought out in the most convincing of ways by a study of no less than 3,411 cases of lobar pneumonia extending over a period of eight years in Cook County Hospital, Chicago, by two doctors the results of which were published in 1925. It was found that

"for the age group 30 to 39 years, in which was the largest

number of patients, the death rate among the abstainers was 18·4 per cent ; among moderate users 29·1 per cent, more than one-half more than among abstainers ; while the death rate among the heavy users was 42·5 per cent, or more, than twice as many as among the abstainers."

The above facts clearly prove that drinkers are less able to throw off the disease by reason of their addiction to alcohol which impairs the capacity of the body defences to overcome or destroy germs of infectious diseases including those of pneumonia.

Alcohol in Pneumonia

Patients suffering from pneumonia caused by the microbe known as pneumococcus in medical science, have severe pain in their chest, breathing being difficult by reason of the pain and inflammation. They feel more comfortable and rest better when alcohol is administered to them because, under its influence, breathing becomes less difficult and painful. This led physicians in the past to think that alcohol has the power to kill off the germs responsible for the disease. What actually happens under these circumstances is that the alcohol depresses the brain so that the sufferer ceases for the time being to feel the pain and is thus able to rest and sleep.

With the establishment of the connection between alcohol and pneumonia, progressive medical men began to question the wisdom of prescribing it for the relief of the above-mentioned painful symptoms or for the support of the failing heart of patients

suffering from it. To set all doubts at rest, Dr. John Hay of the Royal Southern Hospital, Liverpool, made some experiments carefully comparing the results of treating cases of acute lobar pneumonia with and without alcohol. An account of them appeared in the world-famous *Lancet*. In dividing the 150 patients selected for the investigation into two sections, he took care to see that

"The patients in each section were of same type, they were drawn from the same districts, and were attacked at the same season of the year. The nursing was the same, and the food came from a common kitchen. Under such similar conditions, the result in these 150 cases was definitely, one might say startlingly, in favour of that treatment in which alcohol was not administered."

Of the patients in the alcohol group, 36·8 per cent died while of the patients in the non-alcohol group, 21·4 per cent died. Dr. Hay gave it as his considered opinion that

"The only reason for the great difference in the death rates of the two groups was that one group had alcohol and the other had not."

But even more convincing were the results of an experiment on similar lines carried out in a New York hospital by two doctors. The results have been summarised as follows :—

"Dr. Nammack used alcohol in the treatment of his pneumonia patients according to the old-fashioned ideas, while Dr. Lambert agreed to use no alcohol. At the end of the period of the experiment they found that 44 per cent of Dr. Nammack's patients had died and only 16 per cent of Dr. Lambert's patients who had had no alcohol."

Today, most up-to-date physicians treat pneumonia patients with gratifying results with drugs other than alcohol which, in the language of Dr. Muirhead of Edinburgh, they regard as "especially deleterious" when they are already suffering from influenzal poisoning.

We shall now proceed to examine the correctness of the opinion expressed by Sir George Newman, at one time Chief Medical Officer to the Board of Education and the Ministry of Health, United Kingdom who said,

"Alcohol renders people more susceptible to pneumonia and tuberculosis."

Propagation of Tuberculosis

The direct cause of tuberculosis is infection by its microbe known in medical science as tubercle bacillus discharged with the sputum of persons suffering from it. The expectoration resulting from careless spitting by consumptives on floors and walls of rooms when dry, gets mixed with dust and is inhaled by others. It is also a fact that the poisoned dust settles on food or on dishes thus entering the body through the mouth. While quite harmless outside the body, the microbes in question multiply rapidly inside it where it is warm, moist and dark.

As soon as the germs find lodging in the lungs or in the bones, throat or kidneys or some other organ, they at once commence destroying the tissue. The white corpuscles make their way immediately to the

place where they are at work and start building what we may describe as a wall round them. This is called a tubercle because it looks like a little bulb or tuber. The poisonous germs thus completely isolated from the rest of the body, can then destroy only what is inside the bulb.

If the protectors of the body are vigorous and if the person attacked is healthy, the germs are destroyed without much difficulty but if they are stronger than the defensive powers of the system, this disease begins its work of making inroads on the vitality of the sufferer till the process ends in death.

Statistical information to show that tuberculosis is more prevalent in the West among those who frequent public-houses as well as those working in them such as bar-men, bar-maids, waiters, etc., than among the rest of the population, has been relied on for the opinion that most of the mischief is caused by direct infection such as what may be expected in these places of public resort. While it cannot be denied that visiting them is one of the ways of receiving frequent and large doses of infection without which the disease does not generally appear especially in an active form, there is no satisfactory evidence to prove that tubercular or, in fact, any infection can be avoided by drinking at home.

On the other hand, what has already been shown is that alcohol opens the door to infection by lowering resistance to it thus preparing the soil on which it

can flourish in support of which we may quote the views of Dr. John Madden, M.D., who has said,

"It is recognised that the habitual use of alcohol makes the user more susceptible to the invasion of disease germs, including the invasion of the tubercle bacillus."

Preparing the Soil for T.B.

The heavy responsibility of alcohol for the spread of tuberculosis was realised long ago in France where its extensive use in the shape of wine manufactured in that country, is very common so much so that a great French physician, Dr. Brouardel, stated,

"Alcoholism is in effect the most powerful factor in the propagation of tuberculosis. The most vigorous man who becomes alcoholic is without resistance before it."

This was said because alcohol encourages the dissemination of this dreadful disease, known as the great white plague, in at least three ways, the first being that drinking reduces the activity of the white corpuscles making them slow and sluggish, rendering them more or less incapable of rapidly building up the bulb to shut out the invading germs from the rest of the body and, finally of destroying them. Further, the lowering of cell resistance brought about by alcohol makes it possible for the germs to work unhindered and to spread rapidly.

Secondly, even small amounts of alcohol have a tendency to encourage the "don't care feeling" and thus to reduce the drinker's normal sense of caution. The result is that he becomes more or less reckless in

the matter of exposure to cold, rain, snow or other conditions inimical to good health. Thoughtless exposure of the body to these conditions requires the immediate good offices of its guardians and when these are already made inactive through the narcotic influence of alcohol, they become unable to defend it. It is in this way that alcohol assists the invading germs through the creation of conditions favourable to them by providing additional work for the protectors of the body at a time when their powers had already become subnormal through its influence.

Thirdly, when a large or a fairly large proportion of the earnings is spent on liquor, the drinker and his family are deprived of adequate quantities of well-balanced and nourishing food, sufficient clothing suited to the climatic conditions under which they have to live, the required amount of rest, comfortable and well-ventilated housing accommodation with plenty of sunlight as well as other things all of which are necessary to keep the body well-supplied with strong and resistant white corpuscles which only can destroy the tuberculosis microbes.

Alcohol and Susceptibility to T.B.

That alcohol predisposes its user to tuberculosis is proved by the fact that this disease is more common in those countries where most of the people consume liquor daily for long periods than in others where drinking is not common. The correctness of the view that there is close connection between drinking

and this disease is further emphasised by what was found round about 1920, in different parts of France, a country in which the drinking habit is common.

M. Henry Schmidt, a member of the French legislature, stated that in the more sober districts of France, the proportion of deaths from tuberculosis is 1.95 per 1,000, in western France where the consumption of alcohol is large, it is 2.61 per 1,000, while in the area around Paris where consumption is largest and where the injurious influence of liquor is reinforced by bad housing and the exhausting conditions of life, it is 4.54 per 1,000.

While it is true that tuberculosis is not confined to alcoholics only, it is an undeniable fact that the probabilities of survival are higher for the abstainer who enjoys greater chances of improvement under proper treatment. Thus, from the report of the celebrated Phipps Institute for the treatment of this disease, it appears that

"Of patients whom alcohol had obviously harmed, 21.8 per cent died. Of patients who were abstainers or light drinkers, 9.9 per cent died."

As regards betterment of health, it was found that

"Of those patients who had been obviously harmed by alcohol, 29.5 improved under treatment,. Of patients who were abstainers or light drinkers, 49.2 per cent improved."

Heredity Tuberculosis

Not merely does the man who drinks expose himself to the chance of tubercular infection, but the chil-

dren born to him possess reduced powers of resistance to this disease so that a larger proportion among them fall victims to it than the children of abstainers.

This was proved by such eminent men as Barbier, the T.B. specialist, the French physician Reynier and by Dr. Vallow but the final word on this matter was said by Professer G. Von Bunge of Basel, Switzerland, who found that of 149 fathers who were occasional drinkers, 8.7 per cent of the children were tuberculous ; of 169 fathers who were moderate drinkers, the percentage of tuberculous children was 10.7 ; of 67 fathers who were immoderate drinkers, 16.4 per cent of the children had tuberculosis and of 60 fathers who were confirmed drunkards, 27.7 per cent of the children had this disease.

A fact well-known to medical men who take any interest in this problem is that the children of drinkers are very often attacked by hip-joint disease, spinal disease, joint swellings, glandular swellings and what is known as "consumption of the bowels" and of the lungs, even though the parents themselves are not tuberculous.

These and other facts to which no reference can be made here created such a profound impression on western medical men that, at the International Congress on Tuberculosis which met in Paris in 1905, the following resolution was passed :—

"That in view of the close connection between alcoholism and tuberculosis, this Congress strongly emphasises the importance of combining the fight against tuberculosis with the struggle against alcoholism."

This opinion was confirmed at subsequent meetings of this international organisation.

Drinking and Cancer

Cancer is especially liable to occur when the cells of any part are of lowered vitality or are worn out. Sir A. Pearce Gould, F.R.C.S., K.C.V.O., in the Bradshaw Lecture on Cancer stated,

"Age, chronic irritation...and alcohol agree in being conditions that wear out the cells of a part ;...they deteriorate the evolution of the individual cell...and so they cause cancer."

As regards the connection between age and cancer described by Dr. C. C. Weeks (*Alcohol and Human Life*) as one of the four great health scourges of modern civilisation, it was found that middle-aged women are especially liable to this ailment and that

"One woman in every eight who dies after passing her thirty-fifth year, dies of cancer. In the case of men, the figures are one in thirteen."

In considering the second main cause of this disease, we have to remember that alcohol always causes irritation of the tissues with which it comes in contact. It would not perhaps be quite incorrect to assume that, in a respectable number of cancer cases in western countries, the source of this chronic irritation is alcohol.

Sir T.P. Whittaker who examined extensive mortality figures for large groups of total abstainers and moderate drinkers secured from certain old and well-established life insurance concerns incorporated

and doing business in the United Kingdom, found that

"In regard to cancer, the death rate of abstainers is one-half that of moderate drinkers."

Professor J.B.S. Haldane who, later on, carried out investigations in regard to comparative mortality for various trades and occupations, found that

"The death rates in the alcoholic trades (brewers, inn-keepers, barmen, etc.,) from cancer of the mouth, throat, gullet, etc., at ages under 65 are more than double the average."

Sir A. Pierce Gould in the course of his Bradshaw Lecture corroborated the opinion appearing above. He said,

"Cancer is twice as frequent among boozers and London publicans as among clergymen. It is more rapid and more distressing among those who take alcohol."

Referring to the ravages of cancer among users of excessive quantities of alcoholic beverages, Professor Haldane expressed the view that

"There can be little doubt that this extra cancer risk is shared by hundreds of thousands of other heavy drinkers."

Characterising alcohol as the most important of the causes of this practically incurable disease, he said,

"A man is about five times as likely to get cancer if he takes beer daily and no milk, than if he drinks milk daily and no beer."

Alcohol and Sunstroke

Some reference has been made elsewhere to the reduction of endurance of drinking English soldiers when they had to undertake long and arduous

marches in the fierce heat of South Africa during the Boer War. There is other equally convincing evidence supporting this view and to which no reference can be made here which goes to show that, under such conditions, drinkers fall easier victims to sunstroke than teetotalers so much so that a competent medical authority expressed the opinion that "Total abstainers have little to fear from sunstroke."

The predisposition to this disease among consumers of alcoholic beverages has been ascribed to the circulation of alcohol-laden blood in the brain. This not only dilates the blood-vessels with which it is so richly supplied but also leads to their congestion. While it is admitted that there are other contributory factors, very few knowledgeable people will be found to deny the correctness of the statement made in their book by Castellani and Chalmers on tropical medicine that

"Of all predisposing causes, alcohol is probably the most important."

In explaining the part played by heat exhaustion in precipitating attacks of this disease, these eminent authorities stated that

"Alcohol is by far the most important predisposing cause, and accounts for the difference in mortality of expeditions in which soldiers are allowed to drink and those in which they are not."

In his book, *Alcohol and the Human Body*, Sir Victor Horsley has referred to a study of this disease made by Dr. W. R. Phillips and reported in the *International Medical Magazine*. The investigator

was able to ascertain all the facts in the case of 70 out of 140 cases of sunstroke which ended fatally. He found that 60 per cent of the deaths had occurred among excessive drinkers, 30 per cent among moderate drinkers and 10 per cent among teetotallers—decisive proof of the connection between indulgence in alcohol and this ailment.

Alcohol and Healing of Wounds

After having proved that protection and recovery from many diseases, reference to some among which has been made above, are seriously interfered with by the use of alcohol, we shall now proceed to show how it also delays the healing of wounds and retards the cure of many ailments.

The investigations of Kreparsky which became public property in 1898, showed that indulgence, light or heavy, in alcohol diminishes the number and the vitality of the white blood corpuscles. Under these circumstances, the healing of wounds takes place more slowly because of their inadequate supply in the area under the healing process. The correctness of this view is borne out by experience, it being an admitted fact that patients habituated to the consumption of liquor are compelled to stay longer in hospitals on account of the slow healing of their wounds which would have been cured sooner if their tissues had not been damaged through its use.

It is well-known that where there is time, surgeons advise such drinkers as have to seek their help to

abstain from liquor for some weeks and even months before coming to the operation table. It also explains their reluctance to use their knife on patients who indulge in liquor in even what is regarded as moderate quantities.

Further, in the case of accidents or operations, all surgeons are aware of the advantages of having to deal with patients who are habitual abstainers. This is because

"The protoplasm of their tissues is not degenerated, and it has a capacity for growth whereby the desired union of the edges of the wound is effected."

Alcohol and Retardation of Cure

All medical men who have made a special study of tuberculosis agree that alcohol hinders cure while others opine that its use as a drug "aggravates the condition of the patient." Experience has also shown that it is extremely difficult to cure chronic colitis so long as the sufferer persists in drinking.

The old treatment of what is known as senile gangrene in which the circulation in the extremities becomes unsatisfactory by reason of the degeneration of the arteries and tissues, consisted in the liberal use of alcohol under the mistaken idea that the patient stood in need of what is called "supporting". It was abandoned when it was found to be perfectly useless. Today alcohol has, it is understood, been substituted by simple poultices and opiates to relieve pain.

Venereal disease is as much a scourge of society as

any other ailment such as cancer or tuberculosis and is probably responsible for greater damage on account of its hereditary effects. Dr. Transeau tells us on page 56 of his book *Effects of Alcoholic Drinks* that alcohol is responsible for "75 to 90 per cent of venereal infection."

One reason why these loathsome diseases are acquired with comparative ease is that the resistance of the body to their microbes is markedly reduced by alcohol. Once firmly established, they break down the health of the patient with frightful rapidity and his illness is always aggravated and cure rendered more difficult if drinking is persisted in. In such cases, the later stages of syphilis frequently entail needlessly severe and terrible suffering often ending in lunacy. What is known as general paralysis of the insane is universally regarded as "the result of the combined effects of syphilis and alcohol."

With all the facts placed up to now before the reader, he is in a position to appreciate the correctness of the opinion of that advocate of temperance, Professor Kocher, who said long ago,

"In fighting against alcohol, we are fighting against many diseases."

CHAPTER IX

ALCOHOL AND WORK

Apart from various kinds of physical damage resulting from indulgence in drink, alcohol reduces efficiency, physical and intellectual, to which some reference will now be made.

Since the appearance of man in this world, he has lived by the use of his muscles and, of course, of his mind. In the average adult male, the former constitute about 43 per cent of his weight. The importance of the muscular system becomes clear when we think of the conditions under which our prehistoric ancestors had to carry on their struggle for existence. They probably had to climb up high hills, to collect heaps of heavy stones and to drop them down on wild animals which came there and whose flesh made up a fairly large part of their diet. Later on, when they had learnt to trap wild animals, they had to use their muscles to wield the clubs with which to kill them. It was very much later that we had the age of machinery with the help of which much of the necessary heavy work can be done and, today, at least in the West, workers are called upon not only to undertake hard physical work but also to develop and use certain other qualities equally indispensable for the survival of civilised society.

It is the fact that man has to perform two different kinds of work today that makes it needful for us

to examine the effects of alcohol on the output of the body in the shape of hard muscular work such as carrying burdens, digging, laying of permanent ways, etc., as well as other kinds of work in which the physical exertion involved is much smaller but which are no less exacting as they call for clearness of brain and steadiness of hand, eye and nerves.

Alcohol in Muscular Work

Physical exertion, whether heavy or otherwise, implies that the muscles involved contract thereby liberating heat, the energy of contraction being furnished by the oxygen and soluble nutrient material brought to them by the blood. Though we do not know the exact manner in which soluble food-stuffs carried by the blood-stream combine chemically in the substance of the muscles when they contract, it is certain that they are always utilising starchy food and, in the process, forming carbonic acid and other waste products.

As the process of oxidation commences as alcohol enters the blood and regardless of the body's need for heat and energy, continues, until the whole of it is used up, it does not serve as a true food one of the peculiarities of which is that it can be stored up in the body till required for repair, energy or heat. It is therefore that a great scientist said,

"Alcohol is without question a substance which does not nourish the body, build tissue, or repair waste."

Once the correctness of the above view is admitted,

it inevitably follows that alcohol, unlike true foods, cannot help to either maintain or increase the capacity for hard work.

Men doing strenuous manual work at a time when they are more or less under the influence of liquor, think that they are working better, faster and with greater accuracy when those of sober judgment watching them can plainly see a noticeable decrease in their efficiency. As a matter of fact, it is through ignorance that such men mistake for real strength the feeling which, due to their intoxication, seems to resemble it. What is regarded as increased strength derived from the liquor taken is the effect of alcohol, fundamentally a poison, in paralysing, in part or in whole, the higher centres of control whose very important and essential function is to co-ordinate all activities.

The following lines quoted from that standard authority *Alcohol : Its Action on the Human Organism* sum up competent medical opinion on the utility of alcohol as a source of energy :—

"To use alcohol as a staple food for muscular work is to run a grave risk of damage to health and efficiency...Its habitual use by the worker as a substitute for food, or in the belief that it gives a fillip to energy, is physiologically unsound."

Professor Hodge's Investigations

The conclusions as regards the deterrent effects of alcohol on the output of muscular work based more or less on purely theoretical grounds, were

confirmed by a series of very interesting experiments carried out by Professor C. F. Hodge and described in his *Physiological Aspects of the Liquor Problem* to which the reader is referred for more detailed information than can be given here.

Professor Hodge who wanted to find out whether alcohol increases the capacity for muscular work, employed four puppies as nearly similar to one another as possible in age, size, etc., to two of which alcohol was administered in their food. Soon after the experiment had commenced, it was noted that

"The normal dogs were playing actively, whilst the alcohol-taking dogs were quiet and content to do nothing."

In order to ascertain the capability of the alcoholic and non-alcoholic dogs as regards their strength, endurance and resistance to fatigue, they were taken to the gymnasium of the Clark University in which Professor Hodge was a teacher and

"a rubber ball was thrown across the room, a distance of one hundred feet, as fast as it could be retrieved."

To continue the story, careful record was kept of all the dogs that went after the ball and of the particular one which brought it back. One hundred balls constituted a test. On fourteen successive days in January, 1896, 1,400 balls were thrown and it was found that while the non-alcoholic dogs retrieved 992, the alcoholic dogs recovered only 478 balls. In addition, it was noted that the former made more attempts to retrieve the ball than the latter thus offering the

best possible proof of their "greater alertness, strength and energy."

The tests conducted by Professor Durig on himself to which reference is made below corroborate the findings of Professor Hodge.

Professor Durig's Experience

Professor Durig of Vienna, a trained mountaineer, who, from his boyhood, always passed his holidays in the Alps, made a series of experiments on himself to determine the action of alcohol when the user is doing strenuous work which, in his case, was climbing. From the mountain hut in which he lived during this period, there was a gentle rise over meadows after which the path went steeply up to the summit of the Bilken Pass. At the beginning, the horizontal march took 90 and the steep ascent 270 minutes. Towards the end of the month spent in the experiment, the time was reduced so that the horizontal march took 50 and the ascent 160 minutes. All this time, he was not taking any liquor and the improvement referred to above must be ascribed to the training he underwent.

The next stage in the experiment was reached when Professor Durig took a small dose of alcohol mixed with water, the equivalent of a pint of beer of 5 per cent alcoholic strength or a half bottle of claret, along with his early morning tea and a small piece of bread. This small amount did not produce any disinclination to undertake the climbing but the

horizontal walk took 100 and the ascent 185 minutes, there being thus an increase of 10 minutes in the former and 25 minutes in the latter case. This difference was summed up in the following terms :—

"If we interpret this in terms of horse power, we would say that the trained man without alcohol was yielding '275 horse power, whereas, when he did the same work immediately after taking a dose of alcohol, he only yielded '223 horse power.'

The conclusion we are entitled to draw from the above experiment, into the scientific details of which we have not entered, is that there is no justification for the generally held view that alcohol is a good food for muscular work or that it increases physical endurance even though we may see powerful men engaged in back-breaking labour while indulging in it.

Two Notable Experiments

In order to find out the effects of alcohol on muscular activity, Sir Benjamin Ward Richardson, M.D., etc., conducted some experiments on himself in the late sixties of the last century and, as the result of his personal experience, stated as follows :—

"I have found by direct experiment that the effect of alcohol is to reduce the muscular force, and that even during the excitement which alcohol produces in the stage of excitement, there is no actual increase of power, although there may be great muscular disturbance and apparent excess of motion. The general evidence on this point is most conclusive, and if I might venture to state my own individual experience, I would say that the evidence is as surprising as it is satisfactory.. I have worked actively while indulging in a moderate measure of alcohol daily. I have worked actively

while abstaining altogether. In a word, I have made direct personal experiment on the subject, and I am bound to state that the work that can be done during entire abstinence is superior in every respect—in respect to amount, in respect to readiness of effort, in respect to quality, in respect to endurance, and in respect to mental ease and happiness."

The correctness of this view was corroborated by Dr. John Harvey Kellogg, Superintendent of the Battle Creek Sanitarium, patronised at one time by the late Kaiser of Germany and King Edward VII. In a paper read before the American Temperance Association, he mentioned an experiment he had made to examine the correctness of the popular belief that drinking increases muscular strength. He found that

"The total strength of a healthy young man was diminished 33½ per cent as the result of taking four ounces of whisky. It was noticed that the loss of strength in the legs was much greater in proportion than in other parts of the body."

Identical conclusions were reached by Dr. J. J. Abel of John Hopkins University, U.S.A., who said,

"Both science and experience of life have exploded the pernicious theory that alcohol gives any persistent increase of muscular power."

Alcohol and Hard Work

If alcoholic liquors are as good a source of energy as ordinary food-stuffs, one would naturally expect that those who use them will be able to do as much hard work as those who abstain from them. Mr. Charles Wakely in his book, *Abstinence and Work*, says

that, in 1892, the Great Western Railway of England decided to change the gauge of 200 miles of its permanent way and found that the work had to be completed within two days to avoid undue dislocation of its transport system. The account goes on to say that

"Every possible preparation was made, and five thousand skilled workmen were collected for the job, the huge task being accomplished in thirty-one hours. The managers, owing to previous experience, decided that not a drop of liquor should be permitted along the line of work, and they supplied instead good oatmeal and water, about ten tons of oatmeal being used."

The following account summarised from *Work and Wages* written by Sir Thomas Brassey, the well-known constructor of railways, proves the same thing. A gang of navvies who do heavy digging or excavating, working on the Great Northern Railway used to end their labours an hour and a half earlier than the other gangs and yet the former always got through a larger amount of work in the shorter time than any other gang on the line. It is significant that every man in this gang was a strict abstainer. One may quite fairly infer that they could turn out more work within a shorter time, in other words, work much harder, because their energy and muscular strength had not been reduced by alcohol.

The sale of liquor was stopped at North Easton, Massachusetts, U. S. A., under local option but the activities of liquor interests proved too strong for the prohibitionists and, in due course, it was given up.

It is here that Messrs. Ames had, and for all that is known to the present writer, may still have, their factory for manufacturing tools and implements of all kinds, their specialty being shovels. On page 64 of his book, *The Liquor Problem*, Mr. N. E. Richardson says that

"During the months of May and June in a year when there were no license and no saloons in North Easton, Mass., three hundred and seventy-five men employed by Messrs. Ames in the manufacture of shovels, etc., produced more than did four hundred men working under the same labor conditions and for the same length of time the year after."

After explaining the decrease in production as being due to the easy availability of liquor to which the workers had betaken themselves, the author says that the executive of the concern who had closely followed and, naturally enough, regretted the reduced efficiency of their employees, stated,

"We attribute the large falling off entirely to the repeal of the prohibitory law and the great increase in the use of intoxicating liquors among our men in consequence."

Incontrovertible proof in regard to the adverse influence of alcohol on physical endurance, so valuable an asset in the case of the industrial worker, the soldier, the sailor, etc., was furnished by that eminent scientist and medical man who made the following statement at the time of the Boer War :—

"As a work producer, alcohol is exceedingly extravagant, and like all other extravagant measures, leads to physical bankruptcy. It is also curious that troops cannot work or march on alcohol. I was with the relief column that moved on to Ladysmith, and, of

course, it was an extremely trying time by reason of the hot weather. In that enormous column of 30,000, the first who dropped out were not the tall men, or the short men, or the big men, or the little men—they were the drinkers, and they dropped out as clearly as if they had been labelled with a big letter on their backs."

The following extract from the *Handbook of Suggestions on Health Education* issued by the Ministry of Education, Great Britain, for the use of teachers, explains why abstainers are able to do more hard work than non-abstainers :—

"Muscular fatigue following severe exertion is far less readily recovered from if alcohol is taken during the work...Therefore it may be said that experience shows that men engaged in very hard manual labour do their work more easily, in all respects, without alcohol."

A Reasonable Deduction

In order to clear away any doubts which may linger even after the well-authenticated proofs of the disadvantages incidental to drinking in the case of those performing heavy muscular work, the attention of the reader may profitably be drawn to the following extract from page 170 of *Action of Alcohol on Man* by Dr. E. H. Starling, M.D., F.R.S., etc.,

"The idea that plentiful use of alcoholic drinks is beneficial for heavy workers is misleading and mischievous. Although we often find powerful men doing large amounts of work and taking considerable quantities of alcohol, this work is done inspite of, and not by the aid of the alcohol."

It is possible that, in exceptional circumstances, a

moderate amount of liquor may, for the time being, banish the sensation of fatigue and enable a man to continue his efforts beyond the time when they would, in its absence, have come to an end. But as the above high medical authority, no believer in total abstinence, said about a quarter of a century ago, on page 100 of his above mentioned book,

"This increased work is in the nature of a call upon capital, which must be repaid later by a prolongation of the period of rest."

Alcohol and Skilled Work

After learning how alcohol lowers the efficiency of those engaged in hard manual work, we shall try to ascertain the effect of alcohol on the working ability of those engaged in tasks demanding not so much physical strength as attention, skill, accuracy and speed.

Before proceeding further, it is necessary to add that thousands of demonstrations and laboratory experiments conducted under controlled conditions by people about whose competency there cannot be the slightest doubt, have shown that the use of alcohol in admittedly moderate amounts has the effect of seriously impairing the efficiency of workers of this type. Considerations of space permit reference to only a few of these experiments.

In order to test the effect of alcohol on work requiring accuracy in combined eye and hand work,

Uno Totterman used the threading of the needle as the test in 1916. He

"compared the number of needles threaded in 20 minutes on days when he had taken no alcohol with the number he threaded on days when, 11 hours before beginning the work, he had taken the alcohol. The average amount of work done on the alcohol days was decidedly less than when no alcohol had been taken. The dose of alcohol was equivalent to that in about two pints of 3.2 per cent beer, or between 3 and 4 ounces of strong (25 per cent) liquor."

In 1918, Dr. Gyllensward, the celebrated Scandinavian scientist, tested the effects of small quantities of alcohol on accuracy as measured by touching a given mark. The quantities of alcohol given to the subjects of these experiments corresponded to those in five ounces, ten ounces and 1.9 pints of 3.5 per cent beer.

As reported in the *Scandinavian Archives of Physiology* (Annual Volume for 1918, pages 327-347),

"In every test in which the alcohol was taken, accuracy was reduced. In seven experiments with the amount of alcohol corresponding to that in 5 ounces of beer, the average loss of accuracy was 32 per cent."

Dr. Gustav Aschaffenburg chose for his investigation the work of compositors which involves rapid thought and accurate muscular response. The subjects of his experiment were four men, all skilful artisans, three of whom were accustomed to drink in moderation, the last drinking to excess occasionally. As regards the amount of work turned out by them, he found that, taking the average of all these men, it

was "about 9 per cent short of normal when he experimented with 35 grams of alcohol."

The above is a selection from a vast mass of scientifically tested material available in Dr. Haven Emerson's *Alcohol : Its Action on the Human Organism*, 1924 Edition, and Professor William McDougall's *Outline of Abnormal Psychology*.

Dr. Walter R. Miles, the famous experimental psychologist of Yale University, carried out certain investigations in the Nutrition Laboratory of the Carnegie Institution, Boston, Massachusetts, U.S.A., a detailed account of which he gave in his *Alcohol and Human Efficiency* published by the above foundation in 1924. The information given below is a summary of the second chapter of this book comprising pages 29-95.

The subjects of Dr. Miles' experiment were five skilled typists, all moderate users of liquor. After having tested their speed and error on drink-free days, he gave them the equivalent of two glasses of twenty per cent wine. It was found that, within two hours after drinking, their speed was reduced to the extent of two per cent while the errors were increased to the extent of thirty-nine per cent. He next gave them the equivalent of three glasses of twenty per cent wine with the consequence that, at the end of two hours, their typing rate was reduced by four per cent while the errors increased by seventy-two per cent.

After reviewing what has been said above in

regard to the effects of drinking on work in general, every fair-minded man must agree with the opinion expressed by Quensel, one of the most distinguished of European scientists of the last generation, that

"Work and alcohol do not belong together, especially when work demands wide-awakeness, attention, exactness and endurance."

CHAPTER X

ALCOHOL AND ATHLETICS

Nearly all our movements including those which have to be made by the athlete are voluntary movements. We use our muscles to make them because we wish to do so and only when we desire it. As the result of long-continued practice, it is easy to perform all our voluntary movements faultlessly. In fact, some movements may be gone through so frequently that we do them without any deliberate thinking so that they become almost automatic. It is, however, quite clear that whether the movements we make, including those made while participating in sports and games, are deliberately directed by the brain or whether, through long practice, they become automatic, all of them put some strain on our muscles and nerves.

Among competitive sports and games which command great popularity, mention may be made of the typical English game of cricket, the equally typical American game of baseball, Rugby and Association football, hockey, tennis, as well as walking, running, jumping, rowing, swimming and boxing. The qualities required in people desirous of excelling in them are strength, endurance, swift movement, coolness and perfect co-ordination between head, eye, hand and feet.

Alcohol, an Enemy of Athleticism

From what has been said previously in regard to the effects of alcohol on the capacity to perform hard work, it is evident that the athlete cannot expect much benefit from liquor so far as increasing or even maintaining his strength and endurance is concerned.

As regards the help which may be derived from alcohol in making swift movements such as those required in a race, a hard game of tennis, in football, etc., it has to be remembered that science has proved beyond any doubt that as alcohol is not a stimulant but a narcotic, it cannot be expected to yield this result. In the official publication, *Alcohol : Its Action on the Human Organism* issued under Government authority by H.M.S. Stationery Office, London, we are told that

"The direct effect of alcohol on the nervous system is, in all stages and upon all parts of the system, to depress or suspend its functions ; that it is, in short, from first to last a narcotic drug."

It is this characteristic of alcohol which induces disinclination for physical exertion as proved by the investigations of Dr. Hodge referred to previously. This is so because science has proved that alcohol belongs to the group of drugs known as narcotics the characteristic action of which is to check or paralyse activities.

Cool-headedness which presupposes the complete possession of all our faculties is something that can be hardly expected from the man under the influence of

drink who, more often than not, grows reckless which means loss of that composure which is its most important prerequisite.

There can be no doubt that one of the attractions of drinking is the "don't care" feeling, only a round-about way of describing recklessness, caused by the drug effect of alcohol. This explains the credit often given to alcohol as a source of courage which really is foolhardiness and so is radically different from coolness, the first condition for the efficient exercise of which is the complete possession of all our faculties at their best. This quality so essential for the successful athlete enables him to calculate his chances of success taking into account his resources at a critical moment in the contest in which he is engaged and then to arrive at a quick decision as regards his line of action, sticking to it to the bitter end. The drinker does, as a matter of fact, often adhere to the line of action he chalks out for himself, but it is in very rare cases that he makes his decision after properly weighing the pros and cons, of which indeed he is incapable by reason of the clouding influence of alcohol on his brain.

To understand what co-ordination means, we have only to take the case of a game like cricket. The order comes from the brain of the batsman or the fielder telling the different parts of the body what to do. If he possesses this quality, so essential to success in the athlete, the muscles of the arms and legs work in such perfect unison with the eyes and the rest of

the body, that he is able to hit the ball or to catch it anywhere in the field. The muscles are under such discipline and are in such perfect condition that, with the assistance received from the eyes and the ears, they can carry out effortlessly such orders as are issued to them by the brain. The player who drinks can never make his mark because alcohol very seriously interferes with this co-ordination. The mind is not clear and cannot therefore issue correct orders promptly, the eyes do not see, nor do the ears hear clearly, and the muscles, called upon to carry out instructions promptly, are not, on account of alcohol, in a position to work with the mind and the eyes.

Verdict of Experience

Americans were the first to realise the detrimental effects of drinking in seriously impairing the efficiency of the athlete in which connection the following extract from a statement by Major J. L. Griffith, Commissioner of Athletics, "Big Ten" Intercollegiate Conference, should prove interesting. He said,

"I do not know of a single coach or trainer in an educational institution who believes that alcohol is beneficial to an athlete. In fact, it is safe to say that all of our school and college coaches insist that their boys and young men shall abstain entirely from the use of alcohol in any form."

That indulgence in liquor is regarded with equal disfavour by professional athletes in the United States seems clear from the following orders passed by

Mr. Charles W. Murphy, President of the Chicago National League Baseball Club :—

"The use of intoxicating liquors of any kind is absolutely prohibited."

The example set by America was followed by Finland with the result that, at the last Olympic Games held on the eve of the Second World War, the athletes of these two countries who did not use any alcohol did so well that French sportsmen, disappointed by the poor show made by their countrymen, appointed a committee consisting of representatives of 24 most prominent French sport associations, to inquire into the matter. In their report, it was stated that

"Experience has shown in these various sports that alcohol is the worst enemy of power, rapidity and endurance in sportsmen."

That the finding of the above-mentioned French committee is amply corroborated by the expressed opinions of leading champions in practically every sphere of sport is apparent from what appears below.

Cricket and Baseball

J. B. Hobbs more familiarly known as Jack Hobbs is one of the very few men who have been so greatly honoured by an admiring public as to have a monument erected to them in their lifetime. This took the form of iron gates at the world-famous Oval Cricket Ground bearing the following words :—

"The Hobbs Gates. In Honour of a great Surrey and England Cricketeer."

Jack Hobbs expressed the following opinion about alcoholic beverages :—

"The greatest enemy to success in the cricket field is the drinking habit."

Some one financially interested in the alcohol industry in England thought it proper to conduct propaganda in favour of liquor. Accordingly, on the 28th November, 1938, he wrote a letter to the editor of a periodical enjoying a large circulation in western England suggesting that Hobbs was in the habit of indulging in liquor. This great cricketeer indignantly denied the allegation made against him and, in the course of the statement issued in that connection, said,

"I was a staunch teetotaller when ..I was reeling off century after century and making cricket history."

Don Bradman, the celebrated Australian cricketeer and Test Captain, regarded by most of his countrymen as the finest batsman in the world, has been an abstainer all through his life. He had the following thing to say in support of teetotalism :—

"Total abstinence from all alcoholic liquor is a big factor in success. A man who is a total abstainer has an advantage over a man who partakes of alcoholic liquor."

The most popular ball game in the United States is undoubtedly baseball, professionals in which are not only popular but command unbelievably large salaries. Mr. Hugh Fullerton, the leading baseball writer in America, in the course of a conversation with Dr. Deets Pickett, Research Secretary, Board of

Temperance of the Methodist Episcopal Church, stated that, after studying the history of 30 professionals who indulged in liquor in moderation and 30 others who were total abstainers, he found that, in the period 1904-1914, 2 among the drinkers and 8 among the abstainers had continued as players. He next secured information as regards the physical and financial condition of these 60 men. This is given below in tabular form.

Players	Drinkers	Non-Drinkers
Utterly Ruined	8	1
Medium	5	9
Prosperous	3	16
Dead	9	2
Unaccounted for	5	2

It is clear from the above that, at the end of the eleven year period, the abstainers, as a group, were undoubtedly in a better position than the drinkers. Mr. Fullerton was unable to find out the causes of death in all the eleven cases but gave the result of his efforts in that direction in the following words :—

"Non-drinkers-appendicitis—one ; pneumonia—one.

"Drinkers-kidney disease—four ; consumption—one ; suicide—one ; accident—one."

This explains 7 out of the 9 deaths among the drinkers. As regards the two not accounted for, it was said that they

"dropped out of sight before they died ; one a bum (beggar) and the other reported in care of old friends (on whose charity he was living)."

The incompatibility between drinking and distinction in baseball came to be so well-recognised that Ty Cobb regarded as the greatest coach in his time said,

"No man who expects to succeed in baseball should ever think of taking strong drink. Drink and baseball do not mix."

Football and Tennis

The brain of the football player must work with his eyes and muscles. He has to time his movements correctly for if it is defective, a man from the opposing team will rob him of the ball. Further, the team, as a whole, must work smoothly like a well-oiled and carefully used efficient machine. It must have endurance, speed, precision and good judgment. But as alcohol reduces endurance and speed as well as the capacity to work together, it has to be completely abstained from by the ambitious footballer.

It will be agreed on all sides that Rugby football, one of the hardest of games, demands great physical strength, speed and mental alertness. Mr. W. W. Wakefield, M.P., who, in his days, had been captain of England's Rugby Team and might be expected to know something about physical fitness, exhorting Rugby players to cut out liquor said in his inimitably blunt way, "If you take alcohol, you cannot be fit." He was here repeating the views of Dr. Cove-Smith, the well-known medical man who had also been the captain of England's Rugby Team.

Association Football or "Soccer" is less rough than Rugby but it too makes very severe demands on the player's physical and mental powers. Eddie Hapgood, Captain for England, is a teetotaller while the famous Scotch and international player, Alan Morton, said,

"Play fair, play hard, play to win. To do this, avoid all alcoholic liquors as they are your worst enemy."

While not so rough and tumble a game as football, endurance, speed, quickness of eye and brain and absolute physical fitness are demanded of the player desirous of making his mark in tennis. The reasons for abstinence on the part of such an individual were admirably set forth in an article contributed by the well-known American star, Helen Wills, which appeared on the 4th April, 1931, in America's national weekly, *Saturday Evening Post*, from which the following lines are extracted :—

"The precision that tennis demands makes necessary total abstinence—even from beer. Of this the tennis player is aware, as well as are competitors in other sports. The person who says one cocktail or one glass of beer doesn't make any difference in one's eye and co-ordination and balance is wrong—at least from a tennis player's point of view."

That famous tennis players, men and women, abstain from liquor is evident from the following remark made by Dorothy Pound, the great English woman champion, "I am a total abstainer and have been all my life." She is followed by the famous French woman tennis star, Suzanne Langlen who, in her book, *Lawn Tennis For Girls*, says, "I drink no wine or alcoholic drink of any kind."

Commenting on the American triumph in the tennis tournament held at Wimbledon, England, in 1930, *The London Daily Mail* in its issue dated the 8th July, said,

"The Americans' success last week was largely due to their intensive training. Tilden never accepts any invitation to dinner, official or private, until the tournament is finished. He does not drink any alcohol. All the Americans take great care of themselves. Cocktails are forbidden."

Two years later, to be exact on the 12th October, 1932, Selena G. Hey, cousin of the tennis expert William Tilden, said that he

"never used any alcoholic drinks, not even eating food flavoured with them. He feels that no athlete can keep to 'par' if he uses them."

The results of the use of liquor by sportsmen even in moderate quantities were summarised by Hedley Verity, the famous Yorkshire cricketeer and one of England's great bowlers who lost his life in the Second World War. He observed,

"It is quite true to say that strong drink will not help you to play any game successfully. The best way is to cut it out altogether."

Competitive Sports

Dr. William Robertson, Health Officer of Edinburgh, who had, in his college days, been a star football player and an all-round athlete and who, later on, developed into a medical man keenly interested in physical efficiency, knew what he was talking about when he said,

"Beer, whisky, or alcohol in any shape, are all enemies of the athlete. Athletes who drink alcohol in any form never last long."

The above view, expressed in general terms and, as such, applicable to all games and sports, was underlined by A. Ulbrickson, the famous head coach of the rowing crews of the University of Washington which, as the result of the training received from him, made rowing history in the United States. He said,

"To stand the strain of a gruelling three or four mile race, every man must be in perfect physical condition. Each must pull his own oar. The use of alcohol is detrimental to perfect co-ordination of mind and body."

A champion oarsman once narrated how he won a race from a very formidable opponent merely because the latter had taken a drink immediately before starting. This was because, in his view, the qualities essential in rowing are "precision, decision, presence of mind and endurance" and because liquor has the effect of impairing all of them.

The attempt to swim across the English Channel has tested the staying power of many famous swimmers. The first to do so was Captain Webb who was an abstainer. The first woman to do so was an eighteen-year old American girl, Gertrude Elderle, who too was an abstainer. The seventeen-year old Canadian boy, George Young, who crossed the Catalina Channel, a distance of twenty-two miles off the coast of California, through cold and swiftly running water, was also a teetotaller. Mercedes Glietze, the

famous Marathon swimmer, referring to her total abstinence said,

"I could not possibly carry on my profession as an endurance swimmer otherwise."

E. M. Davidson who, in 1931, held the world's record for the 220-yard dash and high jump, according to *Clarion Call*, Australia's premier temperance organ, stated that "Alcohol and running won't go hand in hand."

Eric Liddel, the famous Olympic Games Sprint Champion, after his success said,

"I have never found any use for drink. I am a teetotaller; so were my mother and father; so were my grandfather and grandmother."

Austin Robertson, winner of the World's Professional Sprint championship, said,

"I have never had a drink of alcohol in my life, and I do not think I would have attained the heights that I have, had I taken to drink."

Ritola, world record racer, as the result of his experience expressed the opinion that

"The use of alcohol never fails to prevent one from becoming a first-rate athlete."

It has been held by many that the most outstanding among the competitors at the Olympic Games in 1936, was the American negro Jesse Owens. His swiftness astonished every one who watched him. He said,

"The only use I have for alcohol is for rubbing my body before I run. I have never used, nor do I intend to use, alcoholic beverages."

After having dealt with the effect of alcohol on running, we shall endeavour to ascertain it in the case of endurance as tested by long distance walking. Such an experiment was made at Kiel, Germany, in 1908, on the occasion of a sixty-two mile walking match. The following is a summary of the results as given on page 321 of *The Cyclopaedia of Temperance, Prohibition and Public Morals* (1917 Edition).

"This match was held to decide the championship in long distance walking among German athletes. It was open to all, irrespective of their habits in regard to alcohol, but each contestant was asked to give the committee full information beforehand on the point.

"No alcoholic liquors were used on the march, the drinks being milk, and water either pure or mixed with lemon juice.

"Of the 83 contestants only 24 were abstainers, yet they won 40 per cent of the prizes, while two of the four prize-winners classed as 'non-abstainers' had used no alcohol for months while in training for the match.

"Among the first 25 men to reach the goal, 60 per cent were abstainers, while of the last 26, only 27 per cent were abstainers.

"Of the 24 abstainers, only 3 failed to reach the goal."

In conclusion, some reference has to be made to certain forms of activity which do not make intense demands on bodily strength but still require a clear brain and steady nerves. One of these is billiards. Walter Lindrum, who broke the world's billiards records, said,

"In our profession to become a great player, you must be a teetotaller."

That alcohol is detrimental to the finest co-ordination of movement was recognised by Dr E. H. Starling who, on page 94 of his authoritative work, *The Action of Alcohol on Man*, says,

"No professional acrobat or juggler would take a dose of alcohol immediately before he had to perform the feats on which his livelihood depends."

CHAPTER XI

ALCOHOL AND INTELLECTUAL EFFICIENCY

Those who drink usually fall into three classes. We have first, people who drink regularly but limit the amount of liquor consumed to such quantities that they never show any of the well-known signs of inebriety. Among these come fairly large numbers of drinkers among the educated and well-to-do as well as the steadier among the working classes in the progressive countries of the West. In the second group may be placed what may be called the heavy drinkers who usually consume large amounts of alcohol regularly. Lastly, we have the class of men who, whenever they drink, deliberately take liquor in such quantities as to become drunk. In fact, they drink with the one and only purpose of getting drunk. Such people, not generally in prosperous circumstances, cannot afford to indulge very frequently but they get drunk whenever they are able to secure money for the purpose.

An attempt will now be made to show that moderation in drinking is detrimental to the intellectual efficiency of even those coming under the first group and, after that, to ascertain what effect the consumption of alcoholic beverages has on the mental faculties of the other two classes of drinkers, viz., regular heavy drinkers and incorrigible drunkards.

Alcohol and Impairment of Intellectual Efficiency

Impairment of intellectual efficiency due to the use of alcohol in even small quantities is a matter of everyday experience. It is well-known that, under such conditions, people are incapable of making any mental effort requiring close attention, concentration of thought and execution of decisions arrived at after weighing probabilities. The correctness of this view has been established by a number of experiments of a highly technical nature which need not be described here. For the general reader, the experience of Dr. Harvey W. Wiley, described below, should be enough proof.

This eminent American medical man who, after completing his studies in his own country, spent some years in Germany for post-graduate work has told us that he used to drink beer with his fellow students in the students' club where he spent his leisure hours mainly because of the facilities available there for playing chess. After some time, he found that when playing with an equally skilful opponent, ordinarily the results were 50 to 50 over a series of games. But they became 75 to 25 in favour of his antagonist if he drank only one glass of beer. It cannot be denied that the only explanation of the bad show he made when he had taken the very small amount of alcohol contained in the single glass of beer, was impairment of mental efficiency.

Alcohol and Arithmetic

The two elements which have to be considered in all mental work are first, quality and second, speed. Experiments have shown that work of a more or less mechanical nature such as reading aloud is quickened by small doses of alcohol but that it is rendered "less trustworthy and accurate." All observers are, however, agreed that, under the influence of liquor, the quality of mental work is undoubtedly affected even more than speed. This is proved by the following summary of an experiment conducted by a German scientist in the eighties of the last century :—

"Half an hour daily for six days was utilised in adding figures without any alcohol having been taken. The ability to add increased, of course, every day. On the seventh day, the experiments were begun under the influence of alcohol, which was given for twelve days. Inspite of the deftness acquired through the previous days' practice, the capability of adding did not increase ; instead, it began to decrease very rapidly. On the nineteenth day, the use of alcohol was stopped and, immediately, an improvement manifested itself ; but on the twenty-sixth day, when the use of alcohol was resumed, a decided decrease in the power of adding figures again manifested itself."

Sir William Bayliss, the famous authority, had this in his mind when, in his *Physiology of Food*, he said,

"After even small quantities, the ability to add figures is decreased, although the subject believes that he is doing it unusually well. Moreover, the effect lasts for as long as twelve hours or more".

The correctness of the above view was further

established by the results of a test reported on page 243 of *Alcohol And Man* by the well-known American medical man, Dr. Haven Emerson.

Twenty students each aged 17 years were divided into two batches, the first consisting of more and the second of less efficient people as regards correctness of the results of sums in mental arithmetic worked out by them. Normally, the first "had an advantage in achievement of 2.5 per cent" over the second batch.

The first batch was given alcohol in doses varying from 10 to 40 grams, roughly one-third to one and one-third ounces per dose, in the course of the different tests to which they were subjected to arrive at data on which to base the findings.

Without entering into details which probably will not interest most readers, it may be said that these tests established the fact that in one, two and three hours after the administration of alcohol, the formerly superior first batch did "12 per cent" less satisfactory work than "the previously inferior but abstinent" second batch.

Apart from the fact that alcohol diminishes the ability to do mental arithmetic, the following incident reported on the 28th March, 1940, in the *Evening News* of London shows how, under its influence, even the power of counting correctly is lost. Before proceeding further, it has to be added that though the driver in question was intoxicated, he was not drunk in the ordinary sense of the word.

"A policeman said at Croydon Court on March 28th, that he tested a driver under the influence of drink by giving him 15s. 1½d. in loose coins to count.

"At first the driver said it came to 20s. 1½d. On trying again he made it 19s. 6d."

Alcohol and Memory

As regards memory, the use of alcohol even in small doses was found by Kraepelin to be "distinctly hampering". This German scientist conducted a series of tests to ascertain the effect of alcohol on the capacity for remembering words and numbers to only one of which reference is made below.

A number of individuals were asked to memorise numbers which were written in columns and to repeat them again and again till they could be repeated correctly once. According to this gentleman,

"It was found that, without alcohol, 100 figures could be remembered correctly after 40 repetitions, while, under the influence of alcohol, only 60 figures could be remembered even after 60 repetitions."

Professor Vogt of the University of Christiana, Norway, made tests on himself to find out the effects of alcohol upon memory. Stripped of scientific technicalities, the results arrived at by him may be summarised as follows. He committed to memory lines of poetry on days when he had not taken liquor and on days when he had taken as much alcohol as one would get from one and a half to three glasses of beer which, as most will admit, is a small amount. It was found that

"On days when he took alcohol, he was not able to learn as many lines as he did on the days when he had taken no alcohol. He found that he forgot the lines learned on alcohol days much sooner than he did the lines learned on the other days. One month after the experiment, he again studied the same lines which he had almost forgotten and found it took much longer to re-learn the lines memorized on the alcohol days."

These tests prove that the mind does not learn as quickly, even with small quantities of alcohol, as it does when no alcohol is taken, secondly, that it does not remember what has been learned under the influence of alcohol for as long a period as what has been learned when it is not under its influence.

One reason for the above undoubtedly is that, under the influence of alcohol, there is less ability to pay close attention. This was proved by an experiment carried out by another scientist who found that a particular group of people could pay what may be called less careful and close attention after they had been given small quantities of liquor than when they were sober. It was also proved that

"They were not able to remember so well the things they heard as they were before (alcohol was administered to them)."

Alcohol and Scholarship

From what has been said above in regard to the evil effects of alcohol on some only of our intellectual powers, it follows that it must have injurious results on the intellectual faculties of school-going people indulging in drink: as also that a fair idea of the damage suffered may be gathered from the marks received by them in their examinations.

Such investigations can be carried out best in countries where wine and beer are easily available and where school children are permitted and even encouraged by ignorant and foolish parents and guardians to indulge in them. Formerly, this was quite common in Austria and Italy with such unfortunate results that they attracted the attention of competent men who undertook extensive research work in this direction. Lack of space permits a bare reference and nothing more to two such investigations.

E. Bayer, a school director in Vienna, made careful inquiries to find out the effects of drinking on scholarship among abstaining and drinking children. In the language of the report submitted by him as translated into English by an American prohibitionist,

"Almost half of the 134 abstaining children had 'good' marks. Only 12 of them had poor marks. With the drinking children, the more frequently they used wine or beer, the more the good marks fell off and the poor marks increased."

The next investigation was conducted at Brescia, Italy, where the records of 4,000 school children were carefully examined to collect data bearing on the above problem. These, when consolidated, yielded the results noted below :—

	Abstainers Per cent.	Occasionally drinking Per cent.	Daily drinking Per cent.
Good Marks	42.66	30.5	29.8
Fair ,,"	53.49	41.8	39.7
Poor ,,"	3.85	27	30.3

There cannot be more convincing proof that, whether in the case of adults or of young people, alcohol is positively detrimental to intellectual efficiency.

Alcohol for Artists, Writers, Etc.

There is a generally prevalent notion that because a few artists, writers, etc., have done universally acknowledged good work inspite of being consumers of excessive amounts of alcohol, it must therefore be helpful to people of this class if they are desirous of producing their best work.

As regards the effects of alcohol in stimulating good work among artists, Dr. E. H. Starling has the following things to say on page 189 of his book, *The Action of Alcohol on Man* :—

"It is sometimes brought forward as an argument in favour of the use of alcohol that some of the greatest artistic geniuses have used it to excess, and it has been assumed that it stimulated their emotions and imaginative faculties, even if it weakened their will-power, and having made them indifferent to social customs and anxieties, their aesthetic feelings and passions were enabled to have full play. But 'poets are born not made' and their imagination persists inspite of the effects of alcoholism."

As for great writers like Addison, Edgar Allan Poe, etc., turning out good work under the influence or with the help of liquor, and the assumption that it is conductive to the production of writings of high literary merit, the best answer was given by Sir Victor Horsley in his contribution entitled "The Effect

of Alcohol on the Human Brain" published in the *British Journal of Inebriety* in October, 1905, from which the following lines are extracted :—

"There is no foundation whatever for the view that alcohol by its action on the brain enables the mind to work more quickly..."

"Alcohol even in small quantities interferes with the highest functions of the brain...in large quantities, it abrogates the controlling power of the brain and cerebellum."

Here Sir Victor Horsley was supplying scientific proof of the correctness of the opinion expressed by Schiller nearly a century before the above lines were penned. This great German poet had said, "Wine invents nothing ; it only blabs it (foolishness) out." Goethe also repeatedly declared that the so-called stimulation of poetic ideas through the use of alcohol "could produce only a forced inferior creation of ideas."

Alcohol and Intellectual Profundity

It is not often that ordinary people fully realise the extent to which the powers of conception and judgment are affected adversely by alcohol. Here and there, however, there are exceptions. For instance, we find Herbert Spencer saying in his own peculiarly pedantic way that

"Incipient intoxication, the feeling of being jolly (due to moderate use of alcohol), shows itself in a failure to form involved and abstract relations of ideas."

As a matter of fact, in the highest and most purely intellectual type of thinking where scientific con-

clusions or considered judgments are called for, alcohol appears to be unfavourable to creative work. Thus we find Dr. E. H. Starling saying in his *Action of Alcohol on Man*,

"I do not think.. that alcohol would facilitate the solution of the more complex intellectual problems, or the formulation of great generalisations of science."

This was said because Dr. Starling was aware that the value of intellectual judgment in the spheres referred to by him depends upon our power of recalling experiences, comparing possibilities and using what have been called "the associative links of the brain" in their entirety. This is not possible because the use of alcohol cuts off, either wholly or partially, some of the more important of these links, thus limiting the scope of mental vision.

This limitation of the range of thought is a matter constantly observed in daily life. While any mental effort demanding the immediate recalling of an event or of an abstract ideal or thought becomes somewhat difficult, conversation on commonplace topics can be carried on inspite of the slightly fuddled condition of the brain due to the moderate use of liquor. This happens as the powers of mental observation of persons in this condition are not fully available on account of the partial inactivity of some of the higher centres.

That distinguished mathematician Helmholtz, regarded as one of the greatest observers and thinkers of the last century, noted in himself and described for

our benefit the effect of the smallest quantity of alcohol in impairing the highest powers of thought and conception. While setting forth in the course of a speech made by him at the celebration of his seventieth birthday, the conditions under which his most abstruse scientific thoughts had matured, he said,

"They were especially inclined to appear to me while indulging in a quiet walk in the sunshine or over the forest-clad mountains, but the smallest quantity of alcohol seemed to scare them away."

The views of this nineteenth century savant were confirmed by Professor Huxley who was not a teetotaller. On one occasion, he was asked whether he found alcohol helpful when engaged in intensive intellectual work. In reply, he said,

"When I have to do good or original brain work, I always decline it (alcohol); I become a total abstainer for the time being."

In the previous pages, reference has been made to only a few of the investigations carried out by scientists interested in ascertaining the effects of small amounts of alcohol on mental efficiency. While they have approached the problem from different angles, it cannot be denied that the results arrived at have, in every instance, shown beyond any doubt that intellectual impairment invariably follows the consumption of liquor even where extreme moderation is observed.

Drinking and Business Efficiency

The British Alcohol Investigation Committee has stated that even moderate drinking is responsible for

a change, naturally temporary, in a man's mental attitude without any indication of signs of drunkenness "in the full ordinary sense of the term." Under such circumstances, the Committee pointed out, those who do business with him have to deal with one "whose mind lacks temporarily its normal factor of judgment and conspicuous elements of self-control." It is a self-evident truth that if the other party to some transaction in which such a man is taking part is unscrupulous enough to exploit the situation which develops under this contingency, he can always do so with absolute impunity and much profit.

Apart from the serious disadvantage which the business man invites by his drinking, it is also a fact that, at least occasionally, such a man being dimly aware of his inability to think effectively and to arrive at correct decisions quickly, is inclined to procrastinate and, in fact, to be averse to deal with matters requiring immediate attention through fear of making mistakes. When he fails to correctly realise his mental fogginess, he makes erroneous decisions often to the detriment of his financial interests. Such a person, in the language of the Committee mentioned above, diminishes his powers of

"accuracy (in the transaction of business), tactful handling of colleagues and subordinates, punctuality, reticence in matters of confidence and an additional source of friction is brought to complicate the relations between employer and employed."

Manufacturers and distributors of beer, all very clever men, are aware that drinking is a bar to

business efficiency. It is therefore that they recommend that those who sell liquor should not drink. The author of *Educate For Total Abstinence*, quotes a writer in a liquor trade journal who said,

"It is your business to sell beer, but if you know as much as you ought to know, you will never drink it."

The above advice was given because these men have come to recognise the fact that, with intensification of competition, the demand for all-round efficiency in an ever-increasing measure is being made on those engaged in the production and sale of goods and services and that even moderation in drinking seriously reduces the business man's power to handle his problems promptly and correctly.

Effects on Regular Heavy Drinkers

After what has been stated above about the injurious effects of even moderation in drinking, it hardly seems necessary to say much in regard to the evils incidental to the habitual consumption of large quantities of liquor. Reference must, however, be made to the investigations of two eminent German scientists. The first of these, Dr. Bonhoeffer reported in 1905, that he had noticed "stupidity in perception" among habitual drinkers of large quantities of Germany's national liquor, beer. Such people, he further observed,

"comprehend everything badly , they are unable to concentrate on any special object ; their memory becomes bad."

The second German scientist, Kraepelin, who submitted his first report in 1906, in *Der Alcohol in Munchen* in which he stated that people regularly consuming large quantities of beer slowly develop mental stupidity, went on with his investigations which reached their culmination early in 1909. The results were communicated to *Psychiatric*. The two outstanding facts which he dealt with in his paper were that he had noticed "a considerable reduction in their (drinkers') mental faculties" and that

"after giving up the use of alcohol entirely, even when previously only small quantities had been taken, a marked increase of mentality takes place."

The Incorrigible Drunkard

With reference to the third and last class of men consisting of those who get drunk whenever they can afford to do so, it has been held that as these people indulge in excessive quantities of liquor from time to time, the alcohol-free intervals between drinking bouts enable them to recoup their physical and mental health. While this may be accepted as true within certain limits, it is far from correct to assume that complete and perfect recovery from all the evil effects of indulgence in drink takes place in every case.

Apart from the physical damage which may be suffered from imperfect recovery from past excesses and with which we are not concerned here, Kraepelin found in the case of a particular individual that,

even after total abstinence lasting for a fortnight immediately following a drinking bout, there was "considerable reduction in conceptional power."

There thus seems some justification for the view that repeated bouts of drunkenness ultimately lead to intellectual slowness if not to deterioration because recovery from their effects is never perfect or complete.

The physical damage and reduction in physical and intellectual efficiency due to drinking have the inevitable consequence of shortening the natural span of life, a matter proposed to be taken up in the next chapter.

CHAPTER XII

ALCOHOL AND LONGEVITY

Today most people are aware how essential it is for those who have inherited a healthy body as well as for others who do not have this good fortune, to take intelligent care of themselves thereby ensuring the enjoyment of perfect health with its corollary, a long and useful life. In most cases, people get sick because, generally speaking, they are not as careful as they ought to be about diet, exercise, rest and abstinence from harmful substances such as opium, alcohol, etc.

Moderation and Premature Old Age

We sometimes hear stories of men who live to a century or more inspite of their indulgence in liquor all through their life. More often than not, the qualification is added that this is so because such people consume alcohol in moderation. Those who do not admit the harmfulness of alcohol tell such tales to prove the correctness of their views. What they fail to do is to tell us about the people who die prematurely inspite of their moderate habits and the reasons of which are given below.

When very small amounts of liquor are taken regularly, the waning of the metabolic activities of the body is frequently so gradual that the victims are

almost invariably unaware of its appearance or that it is caused by alcohol. Their unhealthy increase in weight, shortness of breath and lack of energy are generally attributed to advancing age. But it is very rarely that it is either realised or, if realised, acknowledged that the so-called onset of middle age has been hastened by the use of alcohol and, to that extent, the term of life, shortened.

When slightly larger amounts, though still within the limits of moderation, are used regularly, the deterioration of the functions and activities of the body proceeds more slowly than in the case of the heavy drinker. The process of degeneration though comparatively tardy, may be said to be analogous to the gradual decline accompanying old age.

Overtaken almost imperceptibly by premature senility, the victims suffer from one or other of its concomitants, hardening of the arteries, weakness of the heart, digestive or nervous breakdown, calcification of the joints, loss of memory, etc., and die before their time.

These premature deaths, however, are rarely ascribed to their real cause, alcohol. This is mainly because physicians giving the required death certificates, in a spirit of charity, attribute them to the diseases and conditions due to the use of alcohol. This is possible because most of these cases are of the chronic type which makes it easy to assign as the cause of death one or other of the attendant ills.

Comparative Mortality in Various Occupations

The Registrar General of England and Wales publishes certain statistics every ten years. From a contribution entitled "The Influence of the Drinking of Alcoholic Beverages on the National Health" by Dr. Arthur Newsholme, C.B., M.D., etc., author of *Elements of Vital Statistics*, it appears that this official gives what has been called "comparative mortality figures" showing

"the relative number dying in different trades and occupations out of a given number living in those occupations at the same ages."

After examining these statistics for the years 1890-1892, Dr. Newsholme summarised the conclusions he had arrived at, in the following language :—

'If the comparative mortality figure for all men equals 1,000, an equal number of gardeners would only have 568 deaths, teachers 571, grocers 664, doctors 957, while at the other end of the scale are brewers 1,407, innkeepers and inn-servants 1,665, and filemakers 1,791.'

Dr. Newsholme asks the very pertinent question,

"Why is it that a publican's chance of premature death is three times greater than that of a gardener, and that it is nearly as risky to be engaged in a public-house as in the extremely dangerous industry of file-making?"

His answer is that innkeepers and their servants contract and fall victims to many diseases such as cancer, tuberculosis, arterio sclerosis, diseases of the nervous system, gout, etc., generally due to the intemperate habits into which they fall easily on account of the easy availability of liquor.

The conclusion arrived at after the completion of an investigation conducted by another equally competent observer from a somewhat different angle was that

"After reaching the age of thirty, the people who worked with alcohol lived as much as fifteen years less than the people in other occupations."

This highly qualified gentleman had the following explanation to offer for the shortness of life of these people :—

"The reason they had such short lives was, of course, due to the fact that they could drink alcohol any time they wanted it."

The commercial application of the above as well as of similar other well-known facts is to be found in the practice adopted by insurance companies and referred to in the following extract from the standard work, *System of Medicine*, by Professor Sir Clifford Allbutt, M.D., F.R.C.P., etc.

"It is customary to add 50 per cent extra for such dangerous occupations as the drink trade, even if classed as A1 by the medical examiner; but it is probably wiser to follow the rule of the more cautious offices, and absolutely to decline to accept proposals in such cases."

Effects of Past Excesses

That the effects of past excesses in reducing the span of life persist in a marked way even when heavy drinking is replaced by moderation was proved by Dr. Arthur Hunter, actuary of the New York Life Insurance Company and Chairman of the Central Bureau of Medico-Actuarial Mortality Investiga-

tion when, on the 10th December, 1914, he delivered an address before the annual meeting of the Association of Life Insurance Presidents. Among other things, he gave the results of an investigation covering the records of two million lives over a period of twenty-five years furnished by forty-three of the leading life insurance companies of the United States and Canada. The attention of the reader is drawn to the following extract from his speech :—

"It is certain that abstainers live longer than persons who use alcoholic beverages. Among the men who admitted that they had taken alcohol occasionally to excess in the past, but whose habits were considered satisfactory when they were insured, there were two hundred and eighty-nine deaths, while there would have been only one hundred and ninety deaths had this group been made up of insured lives in general. The extra mortality was, therefore, over fifty per cent, which was equivalent to a reduction of over four years in the average life of these men."

Value of Insurance Records

While it is admitted on all sides that the heavy drinker dies much earlier than the abstainer, those interested in this problem wanted to know what happens to the so-called moderate drinker that is one who drinks small quantities every day and who therefore never gets what we call drunk and perhaps by looking at whom we could not tell that he is in anyway different from people who never drink.

It need hardly be added that no correct conclusion on such a matter can be based on knowledge derived from a few cases. If we want to find an answer to

the question as to what is the effect of alcohol on the average moderate drinker, we have to examine fairly large numbers of such drinkers.

The only extensive and reliable records on how alcohol affects the length of human life are those of life insurance companies. Remembering that these concerns never accept heavy drinkers and that proper care is exercised to prevent the fraudulent inclusion of consumers of excessive amounts of liquor among their clients, we have in them a large body of reliable data on which to base our conclusions.

The information from this source is regarded as dependable as, by the nature of their business, insurance companies are compelled to maintain careful records of the health and habits of persons insured with them because those who live long are more profitable to them than those who die too early.

Death Rates of Abstainers and Non-Abstainers

It can be shown from the records of old and well-established insurance concerns that, as a group, moderate drinkers who only are accepted as clients by such organisations, have a higher death rate than teetotallers in which connection mention may be made of the circumstances under which the United Kingdom Temperance and General Provident Institution was founded.

About the middle of the fourth decade of the last century, a Quaker applied to an English life insurance

concern for life insurance and was asked to pay 10 per cent extra because, as a teetotaller, he was supposed to possess subnormal vitality. This annoyed him so much that he immediately proceeded to organise the United Kingdom Temperance and General Provident Institution of London. This kept its teetotal and drinking clients in two separate classes and published, in 1903, the results of its experiment extending over nearly sixty years. It was found that

"Moderate drinkers...died at the rate of 104 per cent of the death table, and the total abstainers at the rate of only 74.3 per cent."

Reference may also be made to the findings arrived at after investigations based on the records of the Abstainer and General Insurance Co., Ltd., of England. Abstainers and non-abstainers who had insured their lives with this office were kept in two groups during a long series of years in the course of which 14,000 deaths had occurred. Some of these persons who had been teetotallers had taken to drink and some who had used liquor had, later on, given it up but as transfers from one class to the other had been very carefully excluded from both classes, the information thus available supplies unchallengeable evidence of the longer life enjoyed by abstainers. The conclusions reached have been summarised as follows :—

"Up to the age of 55, the death-rate of non-abstainers at any age is never less than 45 per cent higher than that of abstainers, and at some age 94 per cent higher than the latter. Between 60-

and 64, it is 32 per cent higher; between 65 and 69, it is 20 per cent higher; between 70 and 74, it is 16 per cent higher than that of abstainers, so that the superiority of the latter persists at nearly every age."

The superiority in regard to life expectancy enjoyed by the person who never touches liquor over the drinker, as shown by this investigation, was such that this concern gave special concessions to the former so that, under its new scheme, the teetotaller aged 30 became entitled to be assured as if he were a non-abstainer aged 24. To put it differently, in the view of this insurance office, the abstainer aged 30 has a superiority of 5 years of vitality over the moderate drinker. And, what is more, this particular concern was prepared to do business with the public on this basis.

The New York Mutual Life Insurance Company after examining its records for the fourteen year period 1875-1889, came to the conclusion that

"Among insured abstainers the death rate was only 78 per cent of the expected rate: among non-abstainers it was 96 per cent."

The general experience of a large number of life offices of Great Britain, in the language of Dr. Arthur Newsholme, is that

"Out of every 100,000, starting at the age of 20, among the abstainers 53,044 reach the age of 70, while among the moderate drinkers only 42,109 reach this age."

To sum up, what we have proved is that heavy drinkers die in large numbers at a premature age and also that, as compared with abstainers, this is equally

true of those who do not drink so heavily and who, therefore, are not disallowed from insuring their lives.

Death Rates in Abstinence and in Gradations in Moderation

The most widely-known and authentic investigation in regard to the part played by the consumption of variable amounts of alcohol in influencing the death rate was that made in 1917, by Dr. Eugene Lyman Fisk of the Life Extension Institute, New York City, on behalf of nearly forty-five American life insurance companies. It is understood that, in the course of this investigation, the records of six million policy holders over a period of twenty-three years were scrutinised.

From the book entitled *Alcohol, Its Relation to Human Efficiency and Longevity* written by this worker, it appears that the policy holders were divided into the following three groups :—

(1) Those who took not more than two glasses of beer, or one whisky a day when their life was accepted and who were regarded as being "extremely moderate."

(2) Those who had been drinking "to any degree" in the past but were not drinking at the time of insurance.

(3) Those who took more than 2 glasses of beer or one whisky when insurance was effected but who kept their indulgence in liquor within such bounds

that they could not, by any means, be considered unacceptable on account of their habit of drinking and who, in the language of Dr. Fisk, "were not considered intemperate."

The average death rate among insured lives in general, and therefore including all the moderate drinkers comprised in the first and third groups, being placed at 100, the investigation showed that

(1) the first group had 118 deaths which is nearly one-fifth more than the average.

(2) the second group had 150 deaths which is one-half more than the average ;

(3) the third group had 186 deaths which is almost double the average.

From the results given above, it is inferable that

(1) continuous indulgence in small amounts of alcohol, two glasses of beer containing about five teaspoonfuls of alcohol, is detrimental to health and that it increases the death rate.

(2) even the total discontinuance of alcohol does not altogether protect the drinker from its evil effects.

(3) because of its habit-forming tendency, the drinkers probably misjudged the daily amount taken so that the low level indicated was not maintained with consequent large increase in the death rate.

The conclusion drawn after consideration of all the above facts, in the language of Dr. Fisk, was as follows :—

"The statistical and laboratory evidence shows very clearly to the unprejudiced mind that even the 'moderate' use of alcohol by any large group of people will increase the average death rate in this group as compared to a similarly constituted group using no alcohol. Wherever you find alcohol, you find this formula at work : More alcohol equals higher death rate."

Life Expectation of Abstainers and Non-Abstainers

After having shown how, generally speaking, drinking is responsible for a high death rate as also that there is direct connection between the quantity of alcohol consumed and the amount of damage suffered by the body as revealed by variations in the death rate, we shall now proceed to ascertain the advantages possessed by the abstainer over the non-abstainer as regards the former's chances of living longer, in other words, to establish, if possible, some kind of relationship between drinking and life expectation.

Long before statistical data on which to base reliable findings on this aspect of the alcohol problem were used, Prof. Lombroso, regarded as a pioneer in the science of criminology, relying on his personal experience, stated that

"Alcohol is one of the chief curtailers of human life. The man of twenty who drinks has a probable life of fifteen years before him, the abstainer of forty-four years."

While the opinion of this great Italian scientist was received with the respect due to his universally

recognised ability and scholarship, it was not, in the absence of data amenable to scrutiny, accepted at its face value especially because at the time Professor Lombroso made the above statement, the world had not yet fully realised the extent of damage caused in all spheres of life by alcohol. The data required to prove the general correctness of his views were found in the records of insurance companies which, for purely business reasons, have to possess full and accurate information in regard to the habits of their clients, so that they might be in a position to adjust the premiums to the risks to which the insured are exposed.

So far as is known, Mr. R. M. Moore, an American actuary who had based his conclusions on materials obtained from certain insurance companies incorporated and operating in the United States, was the first to make a definite statement on the matter, in a paper read by him before the Institute of Actuaries on the 30th November, 1903, in the course of which he said,

"At 30 years of age, the average insured man may expect to live 35 years longer; the abstainer may expect to live 38.8 years longer. At 40 years of age, the average insured man's expectation of life is 27.3 years; the abstainer's, 30.1 years, an advantage of about eleven per cent for the abstainer."

What has to be carefully borne in mind when we consider these conclusions is that the life expectancy of the non-abstainer as compared with that of the abstainer would have been lower if both teetotallers

and drinkers had not together made up the general body of the insured.

Fourteen years later, Dr. Eugene Lyman Fisk after conducting investigations on somewhat similar lines and some account of which has been given above, came to the conclusion that variations in the amounts of alcohol consumed account for

"the shortening of life expectancy on an average of ten to thirteen years (in most cases)."

But probably the most satisfactory, from the popular point of view, of all studies on this particular aspect of the alcohol problem was one to which reference has been made in the following terms by Dr. G. L. Donnelley, M.D., Associate Professor of Pharmacology, Medical School, University of North Carolina, U.S.A., in his book entitled *Alcohol and the Habit-Forming Drugs* :—

"In one study all the people were put in two groups. One group included all who were known to have used alcohol; and the other group included those who had never used it. It was found that the abstainers (those who did not drink), after reaching the age of 35, lived to an average age of sixty-nine. The drinkers from the age of thirty-five, lived to an average of sixty-five and one-half years, or three and one-half years less. Three and one-half years does not seem long, but few of us would care to give up that much of our lives."

Cost of Drinking in Terms of Life Shortening

Round about 1920, the Government of Denmark, a land which, though small in area and politically

unimportant, is never backward in taking proper care of its nationals, appointed a commission. This sent to all physicians in that country a request for information concerning deaths among adults occurring in their practice for one year, "with especial reference to whether or not the cause of these deaths could be traced to drink." It was stressed that only such cases were to be credited to alcohol as were admittedly caused by it.

In due course, answers were received covering 4,300 dead men and 4,280 dead women which, it is understood, was a little over one-third of the mortality in Denmark for that particular year. In order to present the results of this investigation in as striking a way as possible, the Danish Government described them in the following language :—

"If all these alcohol deaths were eliminated from the total, the average longevity of a man of 20 would rise from 45.4 to 49.3 years, and of a woman (of 20) from 47.5 to 48.1 years respectively."

What was intended to be conveyed was that the life of every Danish male would be longer to the extent of 3.9 years and of every Danish female .6 years.

An American prohibitionist, Dr. Edwin F. Bowers, interpreted the above facts in the following very telling manner :—

"Given these figures, and using the per capita consumption of alcohol in Denmark as a divisor, the results proved that every pint of brandy consumed steals 11 hours out of man's normal expectation of life, and every pint of beer cheats him out of approximately 25 minutes of earthly activity."

We may conclude with what the late Lord Wolseley said of this most dangerous, because most insidious, of man's enemies slaying him long before his time, as true today as it was more than three decades ago when it was uttered,

"Drink kills more than our newest weapons of warfare."

CHAPTER XIII

PROHIBITION, A PRACTICAL PROPOSITION IN INDIA

It has been contended that the evil results of drinking, only some of which so far as they affect individuals as such have been given in the previous pages, can be greatly reduced through the imposition of taxes on an ever-increasing scale on alcoholic beverages, the licensing of a limited number of shops, the fixing of hours during which only liquor may be sold, the adoption of various measures for the control of the wholesale and retail trade in it and the putting down of the illicit manufacture and distribution of alcoholic beverages with a strong hand.

That this system which obtains in Great Britain has met with a limited amount of success cannot be denied. But it is also equally true that some of those who are generally moderate in that country have occasional lapses. It is also a fact that it is an utter failure in the case of many people belonging to the well-to-do, the middle, the lower middle and the working classes who lack the requisite will power to resist the subtle lure of drink. This is so well-known that further reference to it is not deemed necessary.

Social workers are aware that this system which was imported into India by our rulers has not done

much in materially reducing drinking among those members of the well-to-do and western educated upper and middle classes who have no objection to it. These go for their liquor to hotels and clubs or drink in their own homes. The alarming spread of the drinking habit especially from the time that India became a base during the Second World War, is explained by the decay of social and religious restraints, the silly adoption of false notions of freedom or the equally foolish imitation of western customs. All these people as well as the occasional and regular drinking sections of the working classes are rarely deterred, by the expense involved, from satisfying their thirst for liquor. So far as these are concerned, the system of control can not only never prevent the alcohol habit, but may also, by the easy availability of alcoholic beverages, be an indirect incentive to its spread.

Failure of Control

The control of liquor as a means of reducing the amount consumed and, necessarily with it, as a satisfactory device for mitigating the physical and other kinds of damage suffered by the drinkers, is supposed to be most efficiently administered in Great Britain. And yet we find that the drink bill of this country, where the temperance movement is very strong, amounted to £257 millions in the year preceding the Second World War rising to £685 millions in 1945. No doubt, part of the increase in the latter year was

due to the raising of taxes on alcoholic beverages. This, however, does not prove that this measure had any effect in diminishing the total amount of liquor consumed by the British people.

Turning to the United States where also we have the control system, we find that the total drink bill which amounted to 2,003 million dollars in 1934, the year after the repeal of America's prohibition law, rose gradually till it reached the astronomical sum of 8,770 million dollars in 1946.

So far as the present writer is aware, we do not have in India any authoritative document supplying information about the amount spent on liquor by the people of this country. But from the statements which appear in the *Statistical Abstract of British India*, published under the authority of the India Government, it appears that the total excise revenue rose from 6 crores in 1900 to 23½ crores in 1928. The figures which are in round numbers include the taxes paid on drugs. These, however, constitute a small proportion of the total excise revenue from 1913 onwards, the year from which the export of opium to China was stopped.

As the duty levied on drink and drugs is, on the average, about 25 per cent of the price paid by the purchaser, it may be held that their consumers spent about 24 crores in 1900 and about 94 crores in 1928. According to a paper by His Excellency Shree C. Rajagopalachari, regarded justly as an authority on

this matter, written for the information of the Twentieth International Congress on Alcoholism, held in London, our drink and drug bill in 1934, amounted to not less than 100 crores. It should be clearly understood that the above figures are nothing but a rough estimate. This, however, does not in any way detract from the general correctness of the view that the system of control introduced by our rulers has failed to check, in anything like an appreciable extent, the spread of the drink and drug habit. On the other hand, it does not seem quite unreasonable to suggest that there has been a considerable increase in the amounts consumed.

Government Responsibility for Increased Drinking

The correctness of the view just expressed seems to be proved by what was said by the Bengal Excise Commission on page 103 of its report. It was stated that

"taking the province as a whole, it is not too much to say that...there is a tendency to restrict the number of shops (selling liquor) where there is a great existing demand and to keep the number unduly high in those districts where the demand is small. Such a policy...must have the effect of encouraging consumption to a certain extent, for the decrease in the number of shops in the districts will do little to check drinking, as the customer of closed shops will buy elsewhere...while the establishment of a shop in places where no sufficient demand exists has undoubtedly a tendency to create such a demand."

Mr. W. S. Caine, the British champion of a more satisfactory excise system for India, pointed out in

the House of Commons, various instances from Government reports of the way in which officials connected with the Excise Department were "induced to increase revenue" by encouraging the sale of drink and drugs.

Quoting from an Excise Report of Bengal, Mr. Caine drew the attention of the House to a paragraph commencing thus :—"Officers deserving favourable notice for the management of the Excise Department of their various districts" ;—followed by the names of officers in every one of whose districts there had been an increase in the revenue, the average being £2,500 each.

Further, Mr. Caine also showed that the pronouncement of the Member in charge of Finance in 1888, that he anticipated a large increase in the Excise revenue had been interpreted by the subordinate officials as an indirect hint to encourage the sale of exciseable articles.

As the anti-drink and drug movement grew stronger in India and began to become more vocal, our rulers grew more cautious in respect of the language they used in giving expression to their views in regard to the excise revenue but there was no change in the old psychology and the desire to utilise the weakness for drink and drugs as a source of revenue persisted. This is amply proved by what was said by the Taxation Inquiry Committee (1924-25).

"The conclusion is unavoidable that progress in the direction of temperance requires a full consideration of all the attendant circumstances and that there is a very serious danger of a heavy loss of revenue with little corresponding advantage."

This is the unfortunate position in which our rulers landed themselves by their adherence to a halting excise policy. And it may be added that this has been the experience of every Government which has depended on the revenue derived from this source to meet part of its cost of administration.

Who Pays Taxes on Drink and Drugs ?

So far as the expenditure on drink in both Great Britain and the United States is concerned, it has been held by competent authorities that it, in the language of a temperance worker who had studied the matter with great care and thoroughness, is

"a reasonable calculation to put two-thirds of the drink expenditure down to the working class."

So far as India is concerned, it is an admitted fact that by far the largest amount of excise revenue is drawn from toddy and country spirit which are almost exclusively consumed by the masses who do not know what it is to enjoy healthy and efficient conditions of life. Being ignorant and reckless of the consequences, they fly to liquor which induces a temporary state of exhilaration and oblivion. Enhancement in the revenue from this source so far at least as India is concerned, implies an increased tendency towards

moral, intellectual and physical degradation and ruin.

Assuming that there has been no increase in the total drink and drug bill of India as estimated by Shree Rajgopalachari since 1934, that is fourteen years ago, and taking the population of undivided India at 40 crores, the annual per capita expenditure on stimulants and narcotics works out at Rs. 2/8 or 3s. 4d. per year. It has been contended that as this is nearly one-fourth of what is spent in Great Britain and about one-eightieth of what is spent in the U.S.A., on drink, the alcohol problem is not so insistent here as in these two countries. The reply to this was given by Sir William Harcourt who, speaking in the House of Commons in the course of the India Excise debate in 1889, said,

"The fallacy of that argument has already been pointed out, because, although only a small part of the population drinks, you spread the amount over the whole population. We are, however, dealing with an extremely poor people, who live on a handful of rice and whose clothing is a single rag."

Thereafter, Sir Harcourt who knew India well and who, therefore, was quite familiar with conditions here stressed the fact that the amount spent on drink took a far larger percentage of the earnings of the Indian consumer than in the case of such a person in any western country.

As regards the taxes imposed on the liquor consumed by the well-to-do classes, the position seems to be that their expenditure on this item is not ordinarily

so high as to compel them to go without the necessities of life. At the same time, it does, in many cases, lead to, the adoption of a lower standard of life and failure to make adequate provision for old age, sickness and the like. But no one can deny that these too suffer from the same kind though not always the same quantum of moral, intellectual and physical damage as poorer alcohol addicts.

The Only Remedy

The only remedy under such circumstances seems to be that, in addition to the renewing of old or the forging of new social and religious restraints which naturally would be operative in some cases, something of a more drastic nature is required for the total eradication of the drink evil in our motherland—a remedy which must be such as to discourage drinking not only among the poor but among the rich and the educated also. And this because if alcohol is really the poison it has been shown to be, India owes it to herself to save all her children, rich and poor, educated and ignorant, from poisoning themselves through its agency.

Ours is such a poor country with so many things to be done for the masses that we cannot afford to spend the 100 crores which, according to Shree Rajagopalachari, is the amount wasted in the purchase of drink and drugs, receiving in exchange diminished physical and intellectual efficiency, greater ill-health, more disease, misery and crime and still deeper

poverty. Nor can we wait for the introduction of prohibition till the excise revenue goes down materially through future tightenings of the system of control. The extinction of the alcohol menace cannot be looked for without drastic State intervention.

It is maintained that what has been said previously is more than sufficient to prove that we must have prohibition for the good of the country. The will of the people voiced through their elected representatives has been made known to their leaders. And both the Central and the Provincial Governments have agreed to obey the mandate given to them,

Who Oppose Prohibition and Why ?

It has been shown already that it is the poor who contribute the major part of the excise revenue. A glance through any volume of the *Statement of Accounts and Finance of the Central Government* or the *Statistical Abstract of British India* will show that the revenue derived from pachai, toddy and country spirit, all consumed by the poorer and the poorest classes, constitutes between 75 to 80 per cent of the total excise revenue. The taxing of drink and drugs, like that of salt, is thus a satisfactory method of making the poor bear part of the cost of administration of the country.

It thus follows that, from the purely fiscal standpoint, the taxation of alcoholic beverages which

violates the recognised canons of taxation is indefensible. It does not tax a man according to his means, but on his vices. The State facilitates what may be called the wasteful expenditure of a rupee by the poorest of the poor so that it might secure four annas in the shape of revenue, all the time being aware that loss of wealth by the tax-payer is the least part of the injury suffered by him.

The result of this selfish attitude on the part of those from whom better things are expected is that a portion at least of the taxes for meeting the cost of administration is shifted from the shoulders of the rich to those of the poor and the needy. And this is quite easy as the governing classes as well as the legislators are drawn either from the rich and the powerful or their representatives. This largely explains the fondness displayed hitherto by politicians for the policy of controlling liquor.

Any measure such as the introduction of prohibition calculated to adversely affect their economic interests, can be, and as a matter of fact is, immediately challenged in and outside the legislature so that those sponsoring it even if their aim is to benefit the poor may be persuaded to recognise the folly of going against vested interests. If they persist in their obstinate course, they can always be thrown out of power.

This has been our experience in India also. For instance, when, in pre-Congress days, we pressed for

the genuine brand of prohibition in places in Bengal where large or fairly large quantities of drink and drugs have been habitually and regularly consumed. those who voted against the relevant resolutions were landlords, money-lenders, men engaged in business, commerce and industry. What was remarkable was that so far as opposition to prohibition was concerned, it was found that European, Anglo-Indian, Hindu and Muslim capitalists and their henchmen who, on other questions held conflicting views, and freely cast their votes against one another, united for once and rejected all the resolutions one by one.

There was a similar experience in the United Provinces where meetings were organised to protest against the imposition of prohibition because this would bring in its wake new taxation. The leadership in the organisation of these meetings came from the capitalistic classes and we saw, to our surprise, the British and Indian industrialists who, on other occasions, had many hard things to say against one another, Hindu and Muslim landlords who, as members of their respective communal organisations ordinarily abused one another roundly, meeting on a common platform and accusing the U. P. Congress Government of passing expropriatory legislation and the like. All this is clear proof that though these and similarly minded persons try to mislead the people by emphasising the impracticability of prohibition, what they really object to is the added contribution

they feel they would be called upon to make to the revenue of the country.

These are the people who have always drawn attention to the difficulties which will have to be surmounted if and when prohibition is introduced and various are the reasons put forward by them for not attempting to carry through what they are pleased to regard as an impossible task. What is overlooked is that difficulties will always have to be faced whenever really good work is sought to be done and that if this is our aim, they must always be overcome.

Below are considered some of the more important arguments advanced by this class of people and it will be shown that, on the whole, they are not unanswerable.

Inevitable Defiance of Law

It has been held by such people that it would be wiser not to have legislation imposing prohibition as it is bound to encourage illicit traffic in liquor. We are also informed that illicit liquor will be made available by those who are always prepared to participate in any activity, however wicked or dangerous, so long as the profits secured are sufficiently attractive. And such people would always find a ready market for their wares because the world is full of addicts and prospective addicts ready to pay any price, however high, for the soul and body-destroying poison without which life loses all its charms for them.

As regards the point raised here namely that it is not wise to enact laws which can be enforced only with difficulty, a question which may be asked is whether it is suggested that society should put on its statute books only those laws which the people can be made to obey without difficulty? And if the criminal classes, always thrown up by society in sufficiently large and embarrassing numbers, strongly favour certain anti-social activities such as highway robbery, forgery, and the like, laws for the suppression of which can be enforced only with the greatest difficulty, are we expected to legalise them thus encouraging their wide prevalence?

If this is not what is meant, the above argument cannot apply in the case of prohibition for the traffic in liquor is a greater social danger than gambling, more dangerous than the making and the circulation of counterfeit money—activities placed under the ban of law.

It is admitted that the introduction of prohibition may, for some time at least, encourage illicit manufacture and sale of liquor. But as the machinery for stopping them gathers momentum, not only the dealers but also the purchasers of illicit liquor will meet increasing difficulties and most of them will refrain from their illegal activities for fear of the law.

But no one can guarantee that with prohibition all over our land, illicit practices will be completely stopped. That they have been going on all along is

seen from the numerous cases reported in the newspapers and in the Excise reports of our provinces. It is surprising that no one demands the scrapping of the existing system of control because of its lack of one hundred per cent success in stopping the illegal manufacture and sale of liquor. One fails to understand why the same charitable attitude is not shown towards prohibition from which complete and perfect disappearance of illicit practices is demanded.

According to Ford, the American prohibition law was enforced with only 60 per cent success but, even then, it produced a marvellous change in the social and economic life of the nation. With the general support of the public, we in India can hope for at least 90 per cent success for here the preventive officers will always get the whole-hearted co-operation of the people and that ought to satisfy any reasonable man.

Fiction of Economic Advantages

One of the arguments often urged against the imposition of prohibition is that the manufacture and sale of liquor gives employment to thousands of persons, that it furnishes a market for various raw materials and contributes a respectable proportion of the revenue of the country as a whole.

As regards the utility of the liquor trade in providing employment, reference may be made to what Viscount Snowdon, the well-known temperance

worker of England, said in his pamphlet entitled *End This Colossal Waste*. Analysing the position in Great Britain, he stated that the per capita value of the output of each person employed in the manufacture and distribution of alcoholic beverages works out at £2,335 per year, that in the woollen and worsted industries it is £497, in building £428, in cotton weaving £412, in cotton spinning £401, in hosiery £374 and in coal mining £175.

The President of the United Kingdom Alliance, the strongest and the largest of the temperance organisations in the U.K., in his letter dated the 8th December, 1938, addressed to the Editor of the *Christian World* pointing out the implications of the above figures said,

"From these figures it will be seen that the expenditure of any given sum employs on the productive side of the industry about six people in cotton, wool and building and as many as fourteen people in coal mining as compared with one person in the drink trade."

There is no proof that, from the angle of providing employment, the drink trade occupies a better position in India than in the United Kingdom. It may also be held that if the capital invested in this business both here and there were utilised in financing really useful industries like those mentioned by Lord Snowdon, it would not only provide employment for a much larger number of individuals but would also add considerably to the wealth of both the countries.

It is also overlooked that the use of the raw

materials and the employment of individuals in the drink trade are unproductive in the sense that they not only do not bring additional wealth to the country but also that they represent so much waste of materials and of labour which can be utilised in other and more profitable ways.

Lastly, the alcoholic beverages which yield revenue to Government cause premature death, disease, human misery and poverty all which have to be taken into account when we attempt to strike a balance between the advantages flowing from the State-controlled traffic in these substances.

Dr. Arnold Lorand of Carlsbad, Czecho-Slovakia, author of *Old Age Deferred, Health and Longevity Through Rational Diet, Life Shortening Habits and Rejuvenation*, on page 123 of his *Building Human Intelligence* summarises the position thus,

"It is very questionable whether or no the State profits by it (liquor trade) from the business standpoint, when it takes in a million with the left hand and spends with the right three millions to remedy the injuries produced by alcohol, not counting the waste of so much valuable human material and the poverty and misery produced by it in many families. Continually new inferior generations are brought up, and misery, illness and crime are spread. Would it not be appropriate to crush the head of the hydra, while there is time and opportunity?"

Infringement of Personal Liberty

One of the arguments advanced most frequently is that prohibition interferes with personal liberty, that moderate drinking is not injurious to health and is

required by many individuals for either its stimulating effect or as a means to secure relief from fatigue. How wrong this view is has been shown already. Attention has been drawn to the fact that in many, if not most, cases, moderation leads to excess.

Apart from this, it has to be remembered that, like he bee subject to the law of the hive, man in civilised society has to obey such laws as may be passed for its good. In other words, personal liberty is subject to such reasonable restrictions as, in the opinion of the law-making authority of the country, are deemed necessary to promote not only peace and order but also the well-being of the community as a whole. The existing unsatisfactory system of control under which the drinker is permitted to get supplies of his favourite poison on certain days and within certain hours, sanitary laws aimed at preventing the spread of filth and disease in places frequented by the public thereby endangering the health of the people at large, regulations for controlling traffic and industry, rules for the conduct of elections to mention only a few instances, are clear infringements of personal liberty. The principle of free speech is established in every democratic country, yet free speech which incites violence and bloodshed is not permitted in them. A man's body is certainly his own and yet he is punished if he tries to commit suicide though, at the same time, he may be compelled by the State to fight its enemies in which he may lose his life. No one dreams of objecting to these clear restrictions on his

personal liberty because of the conviction that civilised society is an impossibility without them.

When a man engages in an activity which promotes inefficiency, disease, poverty, disorder and crime in the community, which increases the burden of taxation used for meeting the additional cost due to these causes, he invades the personal rights of others which rights it is the duty of the State to protect. Good government implies laws based on the principle of "the greatest good of the greatest number." It has therefore been held that

"The health and welfare of the many must outweigh the personal appetites and inclinations of the few"

and the State is only discharging its duty when it tells him "Thou shalt not drink."

The answer to this very flimsy objection was supplied by the Father of our Nation when, on the 6th January, 1927, he said in *Young India*,

"There is as much flaw in the argument that it (prohibition) is an interference with the right of the people as there would be in the argument that the laws prohibiting theft interfere with the right of thieving. A thief steals all earthly possessions, a drunkard steals his own and his neighbour's honour."

Who Welcome Prohibition and Why ?

After learning something about the real reasons generally behind the opposition against prohibition and considering the validity of the arguments advanced against its introduction, we shall try to find

out whether the people for whose benefit this measure has to be introduced are against it or not.

In 1936, that is before provincial autonomy came to India, the hillmen in the Chittagong Hill Tracts in East Bengal, submitted a memorial to Government for restricting the sale of country spirit, the use of which was ruining their younger generation. The same year, about 5,000 Sonthals, and members of other aboriginal tribes living in Birbhum district in West Bengal, led by the District Congress Committee and inspired by the leadership of Sj. Mihir Lal Chattopadhyay, now a member of the Constituent Assembly of India, vowed to give up the use of alcoholic beverages of all kinds and, what is more, remained true to their promise inspite of the very cheap country liquor available in shops selling this vile stuff located in the particular area inhabited by them.

Turning from the rural areas in old Bengal occupying the eastern corner of undivided India, we shall pass on to the Punjab, the western corner of our motherland. The urban population of the small town of Kasur, practically a Muslim one, utilised the provisions of the Punjab Local Option Act in March, 1937, to introduce prohibition within their municipal limits. Out of the 8,818 persons who took part in the voting, 8,816 were in favour and only 2, said to be non-Indians, were against it.

What has to be emphasised here is that the incidents referred to above happened in two provinces in

two remote parts of India where certainly Congress was not as powerful as, for instance, in Bihar, U.P., C.P., Bombay or Madras and that both Hindus and Muslims were equally eager to have prohibition. These people had realised the evils of drinking and thought it necessary to take such steps as were open to them, to end the traffic in drink.

The introduction of prohibition in the Congress provinces from the latter part of 1937 afforded the people of this country the first real opportunity of expressing their feelings freely. Taking six provinces only at random, we find that the Collector of Saran District, Bihar, in reviewing the excise situation for the half year, April to September, 1938, said, "The higher castes of Hindus and orthodox Muhammadans have hailed prohibition with delight." Even the members of certain communities which had been notorious in the past for their excesses had, according to this officer, "invariably expressed pleasure that they had been rescued from the evils of drink."

Passing to the United Provinces, we find that, according to reports received from the officers in charge of the districts of Etah and Mainpuri, women and children of drunkards and addicts were blessing the Congress Government "with uplifted hands, for the miracle as it seemed to them, it had wrought in their daily life," for, ultimately, it is the wife and children of the addict who suffer most and who therefore welcome prohibition most.

By the end of 1938, prohibition was in operation in three districts in the province of Madras. The District Magistrate of Salem where the experiment was started first of all stated in his report that "domestic quarrels of the violent sort have practically ceased and the condition of the women and children has markedly improved. Women are enthusiastic supporters of prohibition."

The Collector of Chittoor district, also in Madras, said in October, 1938, "The vast majority of the people hold prohibition as a real boon. Women especially welcome prohibition." The Collector of the third district, Cuddapah, submitted a more or less identical report.

The reader may rest assured that the above quotations have been picked up haphazardly by the present writer from an old scrap book and that the things said above were duplicated in other provinces of India where prohibition had been introduced.

India's Fortunate Situation

After all is said and done, the reason for the adoption and continuance of some system to regulate the distribution of liquor in every civilised country in the world is undoubtedly due to the feeling that as most attempts to introduce prohibition have failed, mainly on account of the determination of drinkers to have liquor coupled with the cupidity of those who are prepared to meet this want provided they derive

profit from this trade, it is only common sense to compromise by permitting the supply of alcoholic beverages to the public under so-called safeguards.

We in India have, however, a very important thing in our favour which is that, fortunately or unfortunately, religion continues to play a very large part in shaping our social behaviour. The tenets of Hinduism, Islam, Sikhism and Christianity forbid the use of strong drink. It is true enough that there are some small sects using liquor in religious ceremonies. But there is nothing to show that their ritual calls for what we would describe as intoxication on the part of the worshippers for the proper performance of such rites as are enjoined on them.

It is a fact very well-known at least to Indians that in *Shakti* worship where animals are sacrificed on days of high festival and liquor constitutes one of the principal offerings, the requirements can, and actually are, in most cases met by merely touching the tip of the tongue with a tooth-pick dipped in the liquor.

The ceremonial partaking of liquor, under these conditions, may be compared to the use of wine by certain denominations of Christians in the celebration of the Holy Communion. And if this Christian custom does not create drunkards, an opinion which has never been contradicted anywhere and at any time in the world, there is no justification for assuming that the ceremonial use of liquor in the worship of *Shakti* has done or will do so.

Further, it must be made clear that intoxication among members of this particular Hindu sect is found only where drunkards participate in the worship not because of particular feelings of devotion but because it offers an easily available excuse for indulgence in their favourite vice. It is not unreasonable to suggest that even if *Shakti* worship disappears, such people will think out some other excuse for getting drunk.

The strong disapprobation in which drinking is held by the two largest communities in India *viz.*, Hindus and Muslims, is so well-known that it was referred to in a speech delivered by Sir Roper Lethbridge, a distinguished servant of the Crown who passed the active years of his life in India, in the House of Commons on the 30th April, 1889, in the course of which he said,

"I believe that even the extreme measure of the total prohibition of the sale of intoxicating liquors would not only not meet with any resistance from the people of India, but would, in fact, be most popular in that country. That, in my opinion, is the cardinal feature of the situation in India and it contrasts very strongly with the situation in this country (Great Britain)."

It was the recognition of this particular advantage India has over the West where drinking, unless it is excessive, is not generally condemned, that made the Father of our Nation say in *Young India*, nearly three decades later, to be exact on the 23rd June, 1927,

"India is the most promising country in the world for carrying out total prohibition for the simple reason that addiction to drink

is not considered respectable or fashionable and is confined only to a certain class of people."

Fortunately for us, this section of the people constitutes a small percentage of our total population and our National Government has therefore the co-operation of nearly the whole nation. It is also a well-established fact that many confirmed drunkards are welcoming prohibition after experiencing the benefits derived by them and their families through the compulsory deprivation of liquor. It is this which nourishes the hope that the great social experiment initiated by the Father of our Nation will prove a resounding success provided only we keep up our present enthusiasm and continuously explain to our people how injurious alcohol is, how subtle and fatal its power over the weak and the unwary and how we can defeat it only by the adoption of the strictest of measures.

THE END

Mahatma Gandhi on Drink Evil

"If I was appointed dictator for one hour for all India, the first thing I would do would be to close without compensation all the liquor shops, destroy all the toddy palms such as I know them in Gujarat, compel factory owners to produce humane conditions for their workmen and open refreshment and recreation rooms where these workmen would get innocent drinks and equally innocent amusements. I would close down the factories if the owners pleaded want of funds. Being a teetotaller, I would retain my sobriety inspite of the possession of one hour's dictatorship and therefore arrange for the examination of my European friends and diseased persons who may be in medical need of brandy and the like at State expense by medical experts and where necessary they would receive certificates which would entitle them to obtain the prescribed quantity of the fiery waters from certified chemists. The rule will apply mutatis mutandis to intoxicating drugs."

—*Young India*, June 25, 1931.

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